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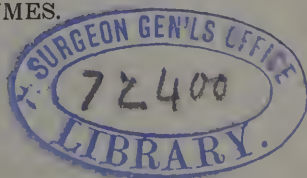
WITH NOTES AND ADDITIONS,

BY

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DIGESTIVE, URINARY,

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UTERINE ORGANS,

HÆMORRHAGE, DROPSY, RHEUMATISM,

GOUT.—FORMULARY, ETC.

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DISEASES

OF

THE ORGANS OF DIGESTION.

STOMATITIS, OR INFLAMMATION OF THE MOUTH.

Stomatitis aphthosa.—Anatomical varieties.—Aphthæ in infants—in adults.—Stomatitis mercurialis.—Symptoms and treatment.—Stomatitis ulcerosa.—Symptoms and treatment.

UNDER the generic term Stomatitis (from στομα, the mouth) we shall include three species of inflammatory affections of the mouth, viz., Stomatitis aphthosa, Stomatitis mercurialis, and Stomatitis ulcerosa.

1. *Stomatitis Aphthosa.*

This form of inflammation of the mouth is distinguished by the appearance of white points or streaks, distinct or confluent, on the surface of the tongue, the interior of the lips, the cheeks, the gums, the palate, and the pharynx. These specks, called indiscriminately aphthæ (from απτω, *accendo*), differ considerably in their anatomical nature. We shall describe the most important of these varieties.

1. The first, and perhaps the most common form, is an oval or circular elevation of the epithelium, having serum beneath it, and corresponding to a cutaneous vesicle; whence aphthæ in general are included in the class *Vesiculæ* of Willan and Bateman's system. When the epithelium is broken, and the mucous membrane thereby exposed, the latter may secrete pus, and the vesicle is thus converted into an ulcer.

2. In another variety the disease is seated in the mucous follicles, which, swelling with the inflammation and augmented secretion, raise the mucous membrane and epithelium above them into round whitish eminences; these aphthæ feel hard under the finger, and are often surrounded by a circle of redness. If the disease advances, the epithelium and mucous membrane covering the follicle are destroyed by sloughing, leaving an ulcer beneath. Aphthæ of this description are generally isolated, but when a great number of follicles are affected they may become confluent. Billard proposes to confine the term "aphthæ" to inflammation of the follicles, but the restriction is inconvenient.

3. We may recognise a third form of aphthæ in those white streaks and patches, without any perceptible elevation of the surface, which occur for the most part in persons of advanced age, or at the close of chronic diseases. They

consist of portions of the epithelium which have lost their transparency. They often assume the appearance of small portions of white fur, adhering to the membrane. Sometimes they accompany the vesicular and follicular varieties.

4. The fourth variety of aphthæ is distinguished by a soft pulpy matter secreted by the mucous tissue under a peculiar form of inflammation. Whether the pellicle consists of concrete mucus or of albumino-fibrin has not been satisfactorily determined. This disease very frequently extends into the œsophagus and stomach, and has been observed by Billard even in the small intestine. It is known in France by the term *muguet*.

The distinction of the varieties of aphthæ thus sketched is founded on their anatomical characters. But they often co-exist; thus we find the vesicular aphthæ, and the inflamed follicles, occurring in the same subject, and as purely local affections; and in children the pellicular inflammation and the confluent form of the second variety are often so intermixed as to be easily confounded.

In a practical point of view it is of less importance to determine, in any given case, the precise anatomical nature of the aphthæ, than the state of the general system. In our remarks on this subject we shall find it convenient to speak of the disease, first, as it occurs in the infant, and secondly in the adult.

The infant is liable to two forms of aphthæ; the more common being that which occurs in the earliest periods of existence. It begins with an erythematous redness of the tongue, on the surface of which may be observed, after a day or two, a number of white points or streaks, consisting either of opaque epithelium or of concrete mucus. In mild cases the disease is confined to the tongue and the roof of the mouth, and subsides under appropriate treatment in two or three days. The attention of the nurse is generally first called to the affection by the reluctance of the infant to take the breast, or by its suddenly leaving off after beginning to suck with avidity. The exciting cause is some temporary disturbance in the stomach and bowels, occasioned by the quality of the milk, or by the improper use of other kinds of food. Antacid medicines, such as soda, magnesia, or chalk, with the local application of borate of soda, will generally put an end to the complaint, unless the food continues to be of an irritating nature. When the inflammation extends to the throat, the white points becoming confluent, and putting on the appearance of a creamy lining, there is commonly sickness, soon followed by diarrhœa, and attended with great restlessness and prostration. In this state a small dose of Hydr. c. Cretâ and rhubarb may be used at first, and afterwards mucilaginous liquids. The gastric and enteric irritation may be soothed by poultices applied to the abdomen. In some cases it may be necessary to leech the epigastrium, but this practice requires the utmost caution in subjects of so tender an age, and in a disease attended with so much exhaustion. When the vital powers are considerably depressed, we must administer broth, and even small quantities of wine, mixed with arrow-root or rice jelly. The aphthæ in such cases require the application of astringent substances diffused in syrup; five or six grains of sulphate of zinc may be added to an ounce of syrup of poppy, with which the parts may be frequently touched by means of a camel-hair pencil. This serious form of aphthous inflammation especially attacks children of sickly habit and ill-nourished. It has sometimes prevailed epidemically; and has also been known to rage in hospitals devoted to young infants. (*Dugès.*)

About the period of the first dentition, or later, infants are subject to aphthæ of the follicular kind, either distinct or confluent; the former connected with transient disorder of the digestive functions, the latter symptomatic of more serious affections, especially febrile attacks, and diseases of the lymphatic system. Although this kind of aphthæ is far more frequent at the period above mentioned, our experience leads us to think, with Dr. Evanson, that Billard was in error when he stated that it is never met with before dentition. (See *Evanson* and *Maunsell on Dis. of Children*, 2d edit. p. 206.) The local treatment is the same as that recommended for the other forms of aphthæ, while the general measures must depend on the previous or accompanying disorders.

Adults are by no means so liable to aphthous inflammation as young children. The vesicles described as the first variety, are met with in conjunction with gastric irritation, and are not very easy to get rid of. It often happens that they are not discovered till they have been converted into ulcers, and are then scarcely to be distinguished from ulcerated follicles. Our first care must be to ascertain and correct the condition of the stomach and bowels, with which the aphthæ are associated. If they fail to subside under treatment thus directed, we must have recourse to local applications. Gargles containing chloride of soda, mineral acids, alum, and tincture of myrrh, &c., are not without use; but the most decisive remedies of this class are the nitrate of silver, and the sulphate of copper, applied in substance to the aphthous ulcers.

The confluent follicular aphthæ, and those belonging to the third variety, occur in the latter periods of exanthematous fevers, chronic visceral phlegmasiæ, especially those of the abdomen, the hectic fever of phthisis, and the breaking up of the constitution in carcinomatous or other structural diseases. Their appearance is inauspicious in all cases, but especially in chronic maladies. When they occur in clusters surrounded by redness upon the velum palati, the inside of the cheeks, or on the tongue, the pharynx being but little affected, the prospect is more favourable than when, as frequently happens, the base of the tongue, the palate, and the pharynx present a diffuse whiteness, looking as if they had been smeared with paint. The latter appearance is accompanied by signs of profound debility, a small fluttering pulse, colliquative sweats, and diarrhœa. But even this combination of symptoms is not invariably fatal, at least if the primary affection has been of short standing. The aphthæ attendant upon fevers are more commonly met with in autumn, and in humid atmospheres. In Holland an aphthous fever is sometimes epidemic, and the most frequent subjects of it are adults, and especially puerperal women. (*Guersent.*)

The *treatment* consists in using measures for supporting the strength, such as the exhibition of bark, wine, broth, jelly, &c., and in applying detergents and stimulants to the mouth and fauces. Ablution with warm water, whenever the patient's strength will admit of it, should precede the use of gargles. To the substances already recommended for the composition of these gargles, a sedative may be added, in the form of laudanum or syrup of poppy.

2. *Stomatitis Mercurialis.*

The inflammation of the mouth excited by the specific action of mercury is a serious adjunct to the *ptyalism* produced by this metal. Ptyalism strictly signifies increased secretion from the salivary glands, and it may occur quite independently of mercurial action, as an accompaniment of hysteria, hypochondriasis, and dyspepsia, but it is then very rarely attended with stomatitis.

The affection is generally preceded by an unpleasant taste compared to that of copper or brass, soon after which the patient complains that his teeth feel soft and tender when brought together, and he fancies they are loosened in their sockets. Soon after this, shooting pains are felt in the face, and a stiffness in the movement of the lower jaw, caused by tumefaction of the submaxillary and parotid glands. The gums are of a deep red colour, and their margins projected, as it were, from the teeth. Here and there we may perceive spots of a dull whiteness caused by opacity of the epithelium. The tongue is swollen, indented at the edges by the pressure of the teeth, and coated with a thick yellow or brownish fur: the breath has a peculiar fœtor, and often before the stomatitis is very manifest. In severe cases there is ulceration of the gums, commencing at the margins, and extending to the interior of the cheeks: occasionally the tumefaction of the salivary glands is so great as to prevent the mouth from being opened; this, together with the engorgement of the tongue, may become so considerable as to induce suffocation. But without attaining so

serious a degree, the stomatitis is productive of great distress, by the impediment to speaking, mastication, and deglutition, as well as by the profuse secretion of saliva. The patient often complains of it more bitterly than of the internal inflammation, for the removal of which the mercury was administered; and he can scarcely refrain from inveighing against his physician, for substituting so loathsome an affection even for a malady which threatened his existence. The local symptoms are generally accompanied by feverishness, and general irritation.

The duration of ptyalism varies with the extent and severity of the inflammation. If ulceration has taken place, the parts seldom recover themselves till several weeks have elapsed; and even without this, it may be almost as long before the spongy state of the gums, and the increased flow of saliva, entirely subside. Ordinarily, however, when there has been only turgescence and soreness of the gums, the affection disappears in a few days.

The severity of stomatitis holds no direct ratio with the amount of the mercury introduced into the system. The enormous quantities requisite for inducing the specific effects of this metal in some subjects, are no less surprising than the sudden appearance of the affection, when only the most trifling doses have been taken. Some persons have, by idiosyncrasy, a remarkable susceptibility of mercurial influence, while others are as strikingly capable of resisting it. The constitutional liability, however, cannot be fairly estimated when inflammatory disease is present, for the most general fact with which we are acquainted as to the specific action of mercury, is, that the readiness with which it takes place is in an inverse ratio with the intensity of the existing disease. Other circumstances, also, very materially affect the result; such as the mode of administration, the state of the bowels, and of the function of the skin, previous bloodletting, &c.; but this is not the place for their consideration.

Treatment. In slight cases, very little more is necessary than to enjoin frequent ablution of the mouth, at first with tepid water, and afterwards with a mild astringent gargle, and to secure a free action of the bowels by saline aperients, and of the skin by warm clothing. When the inflammation is more severe, as indicated by a white line of suppuration along the edges of the gums, we must, in addition to the measures just mentioned, employ others of greater activity. If the tumefaction is general, leeches applied under the lower jaw, with fomentations, will afford relief. The best local application in our experience is the nitrate of silver, either in substance, or in a strong solution, (two scruples to an ounce of distilled water,) by means of a small sponge fastened to a proper handle, or a camel-hair pencil. A lotion of chloride of soda will be very useful for correcting the fœtor, as well as for its stimulant property. An alum gargle containing laudanum is of service, when the active period of the inflammation has passed by. We have very little confidence in internal medicines exhibited as antidotes, such as sulphur and iodine. The supposed efficacy of the former depends, we believe, on its laxative operation. Opium in repeated doses has proved useful by quieting the erethism, and also, perhaps, by lessening the secretion from the salivary glands. But it must be confessed that the affection is very slightly amenable to treatment, excepting as to the progress of ulceration, which may be arrested with tolerable certainty by the nitrate of silver. The practitioner should never neglect to enjoin free ventilation of the patient's apartment, which, indeed, ought to be kept not only airy, but cool.

3. *Stomatitis Ulcerosa.*

Under this term we shall notice a form of inflammation of the gums, which appears in children between the first and second dentition. It is sometimes called cancrum oris, or a milder variety of that frightful disease which we shall

describe presently, under the appellation *gangræna oris*. It would be better to confine both these terms to the latter disease, which is not merely more intense in degree, but distinct in its pathological nature, from stomatitis ulcerosa. This affection begins with inflammation of the outer surface of the gum, and more commonly in the lower jaw; sometimes limited to one side, but more frequently extending to both sides. The inflamed part is extremely swollen, and soon surmounted by a line of ulceration at the margin adjoining the teeth. The cheeks and lips become hard and œdematous, so as to impede the opening of the mouth; and this, together with the quantity of mucus and saliva collected between the gum and the cheek, renders it difficult to procure a satisfactory inspection of the diseased parts. The breath has a peculiar fœtor, allied to the taste called brassy or coppery, and quite distinguishable from the odour of gangrene. There is often considerable flushing of the face and conjunctivæ, with heat and tenderness; and the glands below the jaw are enlarged and painful. If the disease be not speedily checked, the ulceration may proceed so far as to lay bare the alveolar processes; but occasionally, we have known it continue in an indolent state for several days, neither advancing nor disposed to heal. In some subjects, the ulcerated surface is very prone to bleed. More or less fever for the most part accompanies the affection, but is sometimes absent. The bowels are costive, and there is no inclination to food.

The disease prevails chiefly among the poorer classes of the community, and indicates debility of habit as a predisposing cause. The attack may be often referred to the immediate agency of cold, damp, or disorder of the stomach and bowels. When seen early, the prognosis is favourable, unless the disease has supervened upon some other acute malady, such as fever or scarlatina.

Treatment. Though the disease is inflammatory, it is not to be combated by the ordinary antiphlogistic measures. Leeches and cold lotions may be useful in reducing the glandular enlargements, but they cannot be depended upon for stopping the internal ulceration. The best applications for this purpose are of the same kind as we have recommended in the other species of stomatitis, such as the strong solution of nitrate of silver, and the mixture of syrup and sulphate of zinc. A linctus made with a drachm of strong muriatic acid, added to an ounce of honey, is an excellent remedy. We can also speak highly of a gargle composed of alum, decoction of cinchona, and tincture of myrrh. The only objection to this, as to certain other gargles, is, that the age of the child often prevents them from being used in sufficient quantity, or with sufficient frequency, to render them really efficient.

The internal treatment may be commenced by an emetic, unless the lips and cheeks are so swollen and tender as to render vomiting too distressing an action. After the emetic, a brisk purgative of scammony or jalap, with calomel or Hydr. c. Cret., should be administered. If there is much fever, we may exhibit salines and antimonials, but it is seldom necessary to continue them longer than a day or two. The action of the bowels may be maintained by castor oil, rhubarb and soda. Should the ulceration, after the above treatment, show a tendency to spread, we must exhibit the sulphate of quinine, or decoction of bark, in doses suited to the age of the patient, continuing at the same time the local treatment with undiminished energy.

GANGRÆNA ORIS.

Synonymes.—Symptoms.—Causes.—Treatment.

GANGRENE of the mouth may be the consequence of any of the forms of stomatitis, but the disease we are about to consider is idiopathic, or gangrene

proper, beginning with that loss of vitality which in inflammatory mortification is the last of a series of morbid changes. The synonymes of Gangræna Oris are *Cancrum oris, sloughing phagedæna of the mouth, water-canker, stomacace maligna, nomra, necrosis infantilis.*

Symptoms. The existence of this disease is generally first intimated by an indolent swelling of one cheek, without heat or redness. It is hard to the touch, and so little tender or painful, that the patient seems all but unconscious of it, and but for the enlargement being obvious to the eye, the mischief would probably escape notice altogether in its early stage. Indeed, as it is, the tumefaction is occasionally mistaken for affections of a much less serious description. The skin of the cheek has a peculiar glossy or waxy appearance. On examination of the mouth, we detect a whitish or ash-coloured eschar, without any inflammatory redness of the surrounding membrane; generally in the centre of the cheek, or in the commissure of this part and the lower jaw. The gums look pale and spongy. There may be a certain degree of languor, dulness, or slight feverishness, but not less frequently there is nothing to call particular attention to the general health. Such are the principal phenomena of the first stage of the disease. As it advances, the slough spreads rapidly over the interior of the cheek and lip, and invades the gums. Saliva escapes in great quantity, at first clear, afterwards mixed with a dirty sanious matter which has a horrible fœtor. About the same time the outside of the cheek presents a pale ashy spot, which soon becomes livid and sphacelates. The extension of the disease to the bony structures is evidenced by the loosening of the teeth, which are soon thrown off with portions of the alveolar processes. The fluid discharged appears to have a corrosive quality, for the angles of the mouth and the lower lip sometimes become new centres of mortification. We have known both sides of the face attacked in the same individual, and there are cases on record in which all the soft parts of the face, as well as the upper maxillary bones, the palatal, the nasal, and even the ethmoid, were involved in the destruction. Usually, however, death prevents the lesion from extending so widely.

The constitutional disturbance is in many cases far from being proportionate to the severity of the local affection. The pulse is frequent, but weak : the bowels, at first combined, become towards the close of the malady extremely relaxed, and the heat of the extremities is much depressed.

Causes. The subjects of gangræna oris are children, usually between two and five years of age, but we once met with it in a girl who had attained her eighth year. It is confined to children of debilitated habit, and is very rarely observed among the richer classes; low marshy situations and rainy seasons appear to increase the predisposition. Not unfrequently gangræna oris is one of the sequelæ of exanthematous fevers. There is no good reason for attributing the disease to the specific action of mercury, though it may have sometimes supervened upon the latter, which, like any other cause of derangement, may have given the first impulse to the morbid process. It has often occurred when not a particle of mercury had been administered.

As to the pathology, we have already expressed our belief, that the disease is gangrenous *ab origine.* Any inflammation that may be found about the part is secondary only, bearing no causative relation to the gangrene. It has been stated that the commencement is often unattended by pain, heat, or redness. The swelling is the effect of the retarded circulation in the capillaries, and the infiltration of the tissues with serum, or liquor sanguinis. The pressure thus produced is sufficient to explain why the vitality of the central portion is destroyed. The mortification extends by contiguity, because the capillary circulation in the adjacent parts is necessarily affected by the pressure of the diseased tissue. If they have sufficient vital action, they may only suffer inflammation and suppuration, but it too often happens that the lesion assumes the same character as in the neighbouring part, being influenced by the same state of the

general habit. It can scarcely be doubted that this depraved habit consists mainly in deficient plasticity of the blood. The worst case that ever fell under our notice, occurred in a girl recovering from a mild fever, who had been leeched on the forehead. There had been extreme difficulty in restraining the hæmorrhage from the leech bites, in consequence of the incoagulable quality of the blood.

The *prognosis* is from the first unfavourable. Though the child may escape with life, it cannot be saved from disfiguration when the gangrene is once established. If, however, œdema has been discovered very early, and a vigorous treatment adopted, the danger may sometimes be warded off.

Treatment. On the first appearance of the swelling, the cheek should be frequently rubbed with a stimulating embrocation, consisting of camphorated oil and ammonia, and in the intervals should be kept moist with a tepid lotion containing muriate of ammonia and spirit of wine. A careful examination of the interior should be made, so that, on the detection of the slightest appearance of an eschar, the part may be touched with the solid nitrate of silver, or strong muriatic acid. If sloughing has already commenced, the nitrate of silver lotion will be the best application. The mouth should be frequently washed out or syringed with a solution of chloride of soda, if only to moderate the fœtor. M. Billard recommends, that as soon as the livid spot on the exterior of the cheek shows itself, a crucial incision should be made into the centre of the swelling, and butter of antimony introduced, or still better, the actual cautery at a white heat. (*Malad. des Enf.* p. 247.) This remedy has been previously much insisted on by M. Baron. When the gangrene is complete, we must endeavour to stop its extension by carrot, or fermenting poultices.

The medicines to be exhibited are tonics and stimulants, of which carbonate of ammonia in decoction of bark, or quinine combined with camphor, are the most efficient. Wine or brandy may be liberally administered with beef tea; opium is strongly indicated not merely for allaying general irritation, but for the sake of the stimulating influence which it is known to exercise upon diseases of the capillary system characterized by debility. Constipation or diarrhœa must be met by the remedies appropriate to either state. The patient should if possible be placed in a large airy apartment.

The gangrenous affections of the mouth in children, are very frequent in certain situations, and are apt to occur after particular diseases. They are very prevalent in some years, among a crowd of children confined in almshouses or asylums, and obey in this respect nearly the same laws as erysipelas. Sometimes they originate in children who are apparently in good health, but in a great proportion of cases they are merely sequelæ of diseases affecting the general system, such as measles and small-pox, especially the former exanthema. From the causes which govern its developement, there can be little doubt as to the pathology of the disorder; that is, it should be regarded as a disease of the fluids rather than of any solid tissue of the economy; and the local lesion may occur in various other tissues than those of the mouth, especially in the lungs. The gangrene of the mouth is occasionally met with in adults, but rather as a sequel of that of the lungs than as an idiopathic disorder. Mercurial ptyalism favours the developement of gangrene, and during the prevalence of an epidemic disease which passes into gangrene, patients who are salivated are more apt to suffer than those who are not under the influence of this mineral. Its influence, however, is limited, and is rarely sufficient in itself to produce the lesion.

The course of the disorder is the same, whether the gangrene first shows itself as a small whitish eschar between the lower incisors, or a shining slough of the cheek; but in the former case it may be reached much more readily by escharotics, and may be sometimes entirely destroyed. When a large portion of the cheek is attacked, it cannot be reached by escharotics, and more or less extensive sloughing is almost sure to take place. In either case there is little pain, and the disease is rarely discovered until the mouth assumes a characteristic gangrenous odour. The slight pain is readily accounted for by the trifling degree of inflammation which

is generally developed, especially if the gangrene has first occurred, when there is no other evidence of inflammatory action than a red circle around the slough: in other cases a sub-acute inflammation precedes the gangrene.

The indications for the treatment of any form of gangrene of the mouth are extremely simple. These indications are of course twofold—to modify the general constitution and at the same time to act upon the local mischief. If there is not high fever, the patient will use bark and wine, or at least a quinine solution or syrup; if the excitement be much higher, the mineral acids are better adapted to the case, with occasional doses of rhubarb; but we must remember that gangrene of the mouth, like other diseases of much debility, will often require, or at least be benefited by a tonic and almost a stimulating treatment. The best local applications are the nitrate of silver, if the slough be small in extent; if much larger, the best escharotic is the muriated tincture of iron, applied in the undiluted state; after the progress of the disease is arrested, the ulcer will improve rapidly under an astringent stimulant, such as the tincture of myrrh, or the aromatic wine of the French Pharmacopœia.   G.

DISEASES INCIDENT TO THE PROCESS OF DENTITION.

Local symptoms—in the mouth and gums—Remote affections—in mucous membranes.—Skin.
—Nervous system.—Fever.—Causes of difficult dentition.—Treatment.

The developement of organs and functions supplemental to those with which extra-uterine existence commences, is often productive of derangement both in the parts which are the seats of the new action, and in the general economy. The local and general disorders attendant upon the first efforts at menstruation, upon utero-gestation, parturition, and lactation, would sufficiently exemplify this statement; but the truth of it is perhaps still more forcibly illustrated by the morbid affections incident to the process of teething. To describe the various disorders which have been attributed to dentition, would be tantamount to treating of nearly all the diseases of infancy. So extensive a range of effects may be admitted if we view dentition as a predisposing cause, or as inducing a state of the system which more easily yields to the ordinary exciting causes of disease, such as vicissitudes of temperature, hygrometric changes of the atmosphere, improper food, &c.: but we must here confine our survey to the morbid states more immediately referrible to the process in question. These may be conveniently divided into the local and the remote.

I. *Local symptoms.* The local disorders of dentition are for the most part of a trivial nature when compared with the sympathetic derangements. Ptyalism, one of the most common accompaniments of teething, can hardly be considered morbid. It occurs not less frequently in infants who cut their teeth with ease, than in those with whom the process is more difficult. It is probable, indeed, that the free secretion of saliva relieves the vascular turgescence to which the mouth and gums are liable. We cannot, however, fall in with the general notion, that the constant humectation of the part favours the eruption of the teeth by softening the gums.

That the infant suffers from feelings of heat and probably an itching sensation in the gums, is intimated by the pleasure which it takes in the application of cold substances, such as metallic bodies, and in gentle friction by the nurse's finger. These sensations may be independent of much vascular fulness: but when the gums become swollen from congestion or inflammation, there is evidence of pain and tenderness, not only in the fretfulness of temper, the frequent crying and starting from sleep, but also in the reluctance to take the nipple, or in the sudden retraction of the mouth after it had been applied greedily, from the promptings of hunger. In this state, the child may be noticed one instant

thrusting its fingers into the mouth from instinctive attempts at relief, and the next suddenly removing them as if their contact with the gums had occasioned pain. These movements lead us to inspect the gums, which are found red, swollen, and sometimes drier than natural. This condition is most frequent when the teeth are near the surface, but it sometimes occurs even when they cannot be felt by the lancet, and is probably owing to the sympathy between the external parts and the vessels of the dental pulps, the latter being morbidly congested from irregular developement. The inflammation of the gums is sometimes quite superficial, being confined to the mucous membrane, and is then apt to show itself in the form of aphthæ. (See *Stomatitis aphthosa.*)

II. The *remote affections* may be grouped under the following heads :—1, the mucous membranes ; 2, the skin ; 3, the nervous system ; 4, febrile affection.

1. The *mucous membranes.* Irritation of the lining of the nasal passages is denoted by frequent sneezings, and coryza. These catarrhal symptoms, accompanied by suffusion of the eyes and turgescence of the face, often lead to the idea that the infant has taken cold, and sometimes, when viewed in connexion with symptoms of general disturbance, such as feverishness, loss of appetite, restlessness, &c., create a not unnatural suspicion that an attack of measles is impending. Sometimes the irritation extends to the air-passages, producing hoarseness, coughs, and wheezing. We have known in particular children these symptoms precede the appearance of almost every tooth, and subside immediately afterwards. Disorder of the gastric membrane is plainly indicated by the anorexia, sickness, and flatulence ; and that of the intestines by diarrhœa, the stools being unnatural in colour and consistence, and by griping pains in the abdomen, the signs of which are screams, with sudden drawing up of the legs and depression of the anguli oris. Painful micturition, and soreness about the glans penis, the labia, and nymphæ, betoken irritation of the genito-urinary membrane. The several disorders enumerated are generally transient, but occasionally they degenerate into chronic diseases. Thus coryza becomes ozœna, epiphora runs into ophthalmia, catarrh into chronic bronchitis, &c. &c. But when this happens, there is an unhealthy habit of body, either congenital, or produced by external circumstances.

2. The *skin.* The cutaneous affections most frequently excited by teething, are *papular*, as in strophulus and lichen ; *erythematous*, as in intertrigo ; *squamous*, as in pityriasis and psoriasis ; *vesicular*, as in eczema ; and *pustular*, as in impetigo and porrigo ; or *vesiculo-pustular*, as in eczema impetiginodes. The papular and squamous diseases, for the most part, appear and subside with the successive eruptions of teeth ; but the vesicular and pustular oftener remain during the whole period of dentition.

3. *Nervous system.* Under this head are included the most formidable effects of teething. We shall first notice the local nervous affections, and secondly, those which implicate the cerebro-spinal axis.

The local disorders show themselves principally in the form of spasm, affecting both the involuntary and voluntary muscles. As instances of the former, we may specify laryngismus stridulus, and spasm of the sphincters, producing retention of urine, and constipation. The first of these, known by the name of *crowing inspiration* or spasm of the glottis, is often suddenly fatal. When fully developed, it is characterized by a stoppage of the breathing (during which the child either struggles violently or appears death-stricken), followed by a long crowing inspiration. But approximations to this condition may be noticed, by a careful observer, in children who otherwise give no sign of disorder. Thus a slight sound of the kind alluded to, may be heard when the child wakes up from sleep, or when it has been excited to laughter. It should immediately direct attention to the gums, for teething, though by no means the only exciting cause, is probably one of the most frequent antecedents. Perhaps we ought to place under the spasms of the involuntary muscles, that of the orbicularis palpebrarum, which is not uncommon. It is known by a partial

closure of one eye, which in these cases, is, we think, more reasonable to be referred to spasm of the orbicularis, than to paralysis of the levator.

Local spasms of the voluntary muscles are witnessed chiefly in the hands and feet. The flexors of the thumbs and toes are especially liable to the affection. Frequently there is no other token of irritation in the system than the rigid clenching of the thumb in the palm of the hand. Sometimes the flexors of the toes, and those of the carpus, are affected at the same time. These carpo-pedal spasms are occasionally seen in connexion with a peculiar œdema of the dorsum of the foot and of the wrist, described by Dr. Underwood and Dr. Kellie; but the two affections may occur independently of each other.

The above local nervous disorders have been separately noticed, because they frequently occur singly, but not less often they are conjoined, and are even associated with the general affection to be next considered. We have distinguished them as local, because they are manifested in detached parts of the body; but we need scarcely inform the reader, that the irritation, which begins in the nerves of the dental pulp, is transmitted to the spinal marrow, and thence reflected along the nerves of motion.

Cerebro-spinal disorder, sympathetic with teething, may show itself under two very serious forms : eclampsia, otherwise called convulsions ; and meningo-cephalitis or acute hydrocephalus. As these diseases so provoked, in no respect differ from those occasioned by other causes, we shall not enter into any description of them in this place. But cerebral disorder of a less formidable nature often occurs in the form of irritability of temper, wakefulness or uneasy sleep, and sometimes of torpor and heaviness. When such symptoms are accompanied by heat of the head, flushing of the cheeks, constipation and fever, the case may be readily taken for one of idiopathic inflammation of the brain, and not unfrequently it is really in the first stage of such disease. But the speedy subsidence of the symptoms after the removal of the irritation in the gums shows that the affection was symptomatic only.

4. *Fever.* The febrile affection in teething has nothing characteristic. Its elements are a quickened circulation, increased heat, and diminished secretions, especially of the perspiration and urine. It is nearly always attended by some one or more of the mucous or nervous disorders already adverted to.

As difficult dentition does not necessarily give rise to the remote irritations just passed under review, we may inquire in what consists the liability to be so affected? In many cases, the irregular teething itself is only a part of a general fault in the organization, which renders the whole system more or less prone to disorder. In some, the tendency to mucous and cutaneous diseases is shown by the readiness with which they are excited by other causes, such as trifling errors in diet or changes of temperature. In other cases, the neurotic diathesis is strongly marked, and continues long after the work of dentition has been completed. It is not improbable that the afflux of blood towards the head, attendant upon the active nutritive processes in the jaws, may predispose to disorder of the brain. The immediate causes of the irregular developement of the teeth are various. It may be retarded by the unequal ossification of the alveoli. Thus Guersent has seen them closed by plates of bone. (*Dict. de Med.*) Rapid dentition is more frequently accompanied by disorder than a slower developement; but we cannot easily determine in any given case, whether it is only a sign of general irregularity of organization, or whether the excess of nutrition in the jaws is directly injurious, by subtracting from the proper degree of action in other organs. It is, however, quite obvious that if the growth of the teeth is disproportionate to that of the jaws, the dental pulps must be subjected to a pressure which readily accounts both for the local and for the remote irritations.*

* The following Table, extracted from Dr. Ashburner's very interesting Lecture on Dentition,

The treatment of the local disorders of teething is very simple. When there are signs of superficial tenderness, it may be sufficient to moisten the gums frequently with cold water, or to apply the *mel boracis* by the nurse's finger. Slight scarifications afford relief by the mere bleeding. But when the gums are spread and swollen, and there is reason to consider the growth of the tooth considerably advanced, while its emergence is impeded by the rigidity of the gum and the capsule, no time should be lost in making a free incision, which should be carried downwards till the tooth is felt under the lancet. When made upon a molar tooth the incision should be crucial. The relief ensuing upon this operation is often most striking. It will occasionally be needful to divide the gums even when there are no very obvious indications of local irritation, in cases presenting the sympathetic disorder which have been described above, and which from the absence of other causes we may consider referrible to teething. It is a very common error to suppose that if no redness or swelling of the gums is perceptible, there can be no necessity for lancing them ;—as if the teeth could not as easily produce irritation when low in the jaw as when near the surface. The benefit resulting from the operation under such circumstances would be a sufficient answer to the objection ; but we may remark in addition, that if it be allowed that the dental pulps may be the seat of morbid congestion or inflammation, to deny the utility of scarifying the gums for such an affection would be as unreasonable as to declare that no benefit could accrue from leeching the chest in pleurisy, or the abdomen in peritonitis.

The diet must be carefully attended to in all cases of irregular dentition. If the infant is robust and plethoric, or disposed to inflammatory attacks, it must be confined to the mother's food, or to milk and farinaceous articles. But we not unfrequently meet with cases of defective developement, in which a more nutritious diet is strongly indicated. Such infants are to be seen among the poorer classes, pale, emaciated, ricketty, with shrivelled features, loose skin, flabby muscles, and enlarged lymphatic glands, while the teeth are in a state of abnormal forwardness. The change produced by generous diet in these subjects, and by a removal from town into the country, will often prove beneficial.

The treatment of the secondary disorders of dentition will be considered under their appropriate heads.

The irregular growth of the *permanent* teeth is a frequent cause of disorder both local and remote, and as such should always be borne in mind when we are treating patients during the period of the second dentition. Cases apparently very obscure and anomalous in their pathology, have had unexpected light thrown upon them by a consideration of the relative state of the teeth and jaws. Numerous instances may be found in Dr. Ashburner's lectures (*op. cit*).

(*Med. Gazette*, 1833–4), exhibits " the approximation to a normal order of eruption of the first dentition :"—

Periods.				Teeth.
7th month after birth	-	-	-	two central lower incisors.
8th " "	-	-	-	two central upper incisors.
9th " "	-	-	-	two lateral lower incisors.
About 9th or 10th	-	-	-	two lateral upper incisors.
" 12th or 14th	-	-	-	four first molars.
16th, 17th, 18th, 19th, or 20th		-	-	two upper canine.
22d to 30th	-	-	-	four last molars.—*Author*.

GLOSSITIS.

Symptoms—local—general.—Causes.—Treatment.

INFLAMMATION of the substance of the tongue is far less frequently met with as an idiopathic affection, than as the accompaniment of other diseases. It has been observed in the course of exanthematous fevers, especially small-pox and scarlatina, and as an extension of disease from adjoining parts, as in Tonsillitis and Ptyalism. Membranous inflammation of the tongue does not require a separate consideration, being comprised under the general head of STO-MATITIS.

Symptoms. The local symptoms of glossitis are the same, whether it is primary, or only a secondary affection. The organ becomes hot, swollen, and painful towards the tip, the colour of which is of a deeper red than usual. The tumefaction soon extends to the body and the base, producing rigidity and difficulty in its movements, both in speech and deglutition. The surface is sometimes dry, and in other cases covered with a thick albuminous crust. As the disease advances the tongue acquires so great an increase of volume as to fill the whole cavity of the mouth, and even to project considerably beyond the teeth. By the swelling at the root of the organ dyspnœa is necessarily occasioned, as well as pressure upon the great veins of the neck, to a degree which sometimes threatens apoplexy. The progress of the disease is often frightfully rapid, the most extreme engorgement requiring only a few hours for its production.

If the inflammation is idiopathic, it is sometimes preceded by rigors and other symptoms of fever. The pulse at the commencement is quick, full, and hard. The skin also, and the secretions, denote strong phlogistic fever. But when the swelling has begun to impede the respiration, the pulse becomes feebler, and the skin is bedewed with cold perspirations.

The disease may subside by resolution, or terminate in suppuration or gangrene. The anterior part is most liable to gangrene, in consequence of the interruption to the circulation produced by the pressure of the teeth, a pressure which necessarily takes place when the organ is at once swollen and protruded.

The *causes* of glossitis may be those common to all phlegmasiæ, but the more specific are injuries inflicted on the organ by mechanical or chemical irritants. The effect of the former is often witnessed in epileptic patients, who have bitten the tongue during the convulsive paroxysm. The sting of insects, such as the wasp or bee, may excite a very alarming form of inflammation. M. Marjolin alludes to the case of a young man (a patient of M. Dupont) who suffered a severe attack after chewing a toad ! (*Dict. de Méd.*)

Treatment. This disease must be regarded as dangerous, and requiring very prompt treatment. Blood should be abstracted from the arm, in quantity corresponding to the urgency of the symptoms ; but the case must be seen early for this measure to produce much benefit. Local depletion is of the utmost importance; the tongue should be covered with leeches, and should the swelling notwithstanding advance, incisions must be made from the base to the tip, care being taken to avoid the ranular arteries. The relief from this treatment is generally very decided. It has the advantage not only of disgorging the capillaries, but also of giving exit to any collection of pus that may have been formed. As auxiliaries to local treatment we may apply ice to the surface of the tongue, and a blister to the throat and neck.

Purgatives must be freely administered from the commencement, and when the deglutition is too much impeded to admit of their being taken by the mouth,

we must resort to enemata. The enema colocynthidis will be useful under these circumstances.

If suffocation is threatened, a surgeon should be at hand prepared to practise tracheotomy. Mr. Benjamin Bell has related a case of glossitis from mercurial action in which the patient's life was saved by the operation.

PAROTITIS.

Specific variety.—Symptoms.—Causes.—Treatment.—Common variety.—Its symptoms and treatment.

INFLAMMATION of the parotid gland may be conveniently considered under two varieties, the specific and the common.

1. *Specific Parotitis.*

This disease, vulgarly called the mumps, is characterized by pain and swelling of one or both of the parotid glands. The local affection is nearly always preceded by slight febrile disturbance. It first manifests itself by fulness and soreness at the angle of the jaw, impeding the movement of this part. By degrees the tumefaction extends towards the space between the cheek and ear, and also downwards, involving the submaxillary glands. On the fourth day it begins to subside; and during or after the decline it is not uncommon for the mammæ or testes to become painful and swollen. If the turgor of these parts or of the parotid itself is suddenly removed, we have reason to apprehend vicarious disease in the brain.

As this form of parotitis usually terminates by resolution, it is probable that the vessels of the glands are in a state of congestion rather than of inflammation. In strumous subjects, the disease is apt to lay the foundation for chronic enlargement and induration of the glands.

Causes. Specific parotitis is usually excited by contagion, but it sometimes appears under circumstances which forbid the supposition of such a cause, and yet it may be afterwards propagated in this manner. Analogous observations have been made on other well-known contagious disorders. It seems highly probable that the specific alteration of the blood may be induced by common causes, and that an emanation from this may take place, capable of inducing the same affection in other subjects. That the blood is implicated we infer from the previous constitutional disorder, and from the great tendency to metastasis. But before adopting this inference we must admit first that a tendency to metastasis indicates a diseased condition of the whole system, and secondly that this general fault (in acute disorders at least) has its seat in the blood.

Specific parotitis is one of those diseases which seldom occur more than once in the same individual, but many persons escape it altogether.

The *treatment* required is generally very slight. The part should be kept warm by flannel, and no attempt should be made to reduce the swelling by cold lotions. If the patient manifests an anxiety for some medicinal application, we may direct the flannel to be imbued with a weak solution of camphor in oil. The bowels should be gently relieved by laxatives, but violent purgation is to be avoided. The diet should be quite unstimulating, consisting chiefly of farinaceous substances and mild diluents; the patient must remain in the house, and avoid all risks of cold.

The swelling of the mammæ or testes requires the same kind of treatment,

or rather non-interference, as that of the parotid, unless there are manifest signs of active inflammation; in which case depletory measures will be needed. Should metastasis to the brain unfortunately occur, the secondary disease must be attacked with the same energy as if it had been idiopathic.

2. *Common Parotitis.*

This form may result from exposure to cold; but when this happens we shall generally find that the first impression was made upon a decayed tooth, and that the parotid has been subsequently engaged. The swelling is very considerable, and attended with severe pain: the symptomatic fever sometimes runs very high. If the inflammation be not speedily got under, it will advance to suppuration, a process which in this part is extremely tedious. The abscess may break externally, or discharge itself into the meatus externus of the ear.

In a vigorous constitution the disease must be combated both by local and general depletion, and in all cases by leeching, conjoined with purgatives, diaphoretics, and low diet. Should the swelling not diminish under this treatment, we must endeavour by fomentations and poultices to hasten the suppurative process. When this is fully established, and fluctuation can be felt, the abscess must be opened. If the discharge continues, it will be necessary to sustain the patient's strength by tonics and a generous diet.

A less active but not less troublesome form of parotitis is often met with as one of the sequelæ of scarlatina, and occasionally of other febrile disorders. The swelling is hard and indolent, and generally extends to the glands of the neck. It requires leeching, fomentations, and poultices, and a degree of the antiphlogistic regimen, proportionate to the previous amount of disease and to the impairment of the patient's strength. A somewhat analogous form of subacute parotitis may be induced by cold in strumous subjects, and is very apt to degenerate into chronic disease.

ANGINA, OR INFLAMMATION OF THE THROAT.

THE term *Angina* implies inflammation of the parts bounded anteriorly by the velum pendulum palati and its columns, and posteriorly by the upper part of the pharynx. We shall consider it under three forms: *Angina Diffusa*, *Angina Membranacea*, and *Angina Tonsillaris*: the two first being distinguished by the character of the inflammation, the third by the part principally affected.

ANGINA DIFFUSA.

Varieties.—Symptoms.—Causes.—Prognosis.—Treatment.

IN this, which is the most common form of sore throat, the inflammation is seated in the mucous membrane covering the posterior fauces, tonsils, and pharynx. It is for the most part superficial; but in severe cases it may extend to the submucous cellular tissue. It is characterized by increased redness of the membrane and a greater fulness than natural. But the former may vary from the slightest possible exaggeration of the normal hue to the deepest crimson or the most vivid scarlet. When the tint is paler than usual, which sometimes happens, the appearance is owing to œdema. The tumefaction will

depend partly on the degree of congestion, and partly on the amount of serous infiltration. In comparing angina with cutaneous inflammation, we should say that it oftener bears an analogy to erythema than to erysipelas.

There are three forms of angina diffusa. In one there is a bright red efflorescence of the throat, with tumefaction, and a copious secretion of mucus. In a second variety the membrane has a duller and deeper red, and is tense and dry. The third form is marked by relaxation and puffiness of the membrane, in consequence of serous secretion under the epithelium, or in the substance of the mucous tissue itself, or in the subjacent cellular membrane.

The symptoms, common to these varieties, are painful and difficult deglutition, a sense of soreness in the throat, irritation, or tickling, with frequent disposition to hawking and exspuition, a feeling of choking, and some impediment in articulation. The hearing is occasionally obscured by extension of the inflammation to the Eustachian tube. The second variety is often attended with more local irritation and distress than either of the others. The general symptoms of fever vary with the severity of the attack. Sometimes there is considerable delirium when the fever runs high. The character of the fever is more frequently sthenic than typhoid, but it varies with the previous condition of the individual, or the epidemic constitution of the atmosphere. The third form is frequently exempt from fever, the others very rarely. This form is also more frequently met with as a chronic affection.

Causes. The most frequent causes of this form of angina are rapid variations in the temperature of the atmosphere, and the prevalence of humidity with cold winds, as in the spring season. Exposure of the feet or even of the hands to cold and moisture, when the body has been previously heated, will readily induce the affection in persons predisposed. Some individuals are attacked almost instantaneously on passing from a heated room or crowded assembly into the outer air. Angina may often be traced to endemic causes, such as a humid soil, the vicinity of stagnant water, a river-fog, &c. Some of the worst causes met with in practice are those in which the angina is an accompaniment of scarlatina. In many instances the disorder is secondary to gastric or gastroenteric irritation.

The *prognosis* in uncomplicated angina is generally favourable. The cases which create most apprehension are individuals previously enfeebled, for in such subjects the accompanying fever often assumes a typhoid aspect. The local affection can seldom excite alarm, unless there are symptoms of an extension of the inflammation to the larynx. This is more likely to occur in the second of the varieties above alluded to.

Treatment. In slight cases the exhibition of an emetic followed by a brisk purgative will often cut short the attack ;—to which result the use of a pediluvium, and the application of a sinapism to the throat will effectually contribute. When notwithstanding such measures the inflammation increases, or if it has assumed an aspect of severity from the commencement, leeches must be freely applied to the exterior of the throat. If there is sharp symptomatic fever, general bleeding must be also practised. Antimonials and salines are useful auxiliaries. The best applications to the diseased part are warm water gargles, or the vapour of hot water impregnated with hops, henbane, or some other sedative. Stimulant of discutient gargles may do more harm than good in the first stage of the inflammation. But when antiphlogistic measures have been duly executed, and a state of relaxation or passive congestion only is left, or when the case has presented this character from the beginning, such remedies are applied with good effect. A solution of nitrate of potass in camphor mixture, to which laudanum should be added, may be used pretty early. Gargles of alum, muriatic or sulphuric acid, and tincture of myrrh are better adapted to a later period. Capsicum is deservedly much esteemed in the relaxed sore throat ; but of all the local remedies there is none that can equal the nitrate of silver in applicability to all varieties and periods of the disease. Having already adverted to the

excellence of this remedy in stomatitis, we need only remark that mere analogy would suggest its employment in angina. It has been mentioned that the inflammation sometimes terminates in suppuration. When this takes place a frequent seat of the collection is the loose tissue of the velum. But wherever formed it may require the use of the lancet, to give egress to the pus. This should be effected as soon as we can discern a pointing of the abscess, or perceive fluctuation by the finger. The neglect of a timely incision will cause a much greater extension of the suppuration.

Blisters are of service after leeching, or even before the latter, in cases which will not admit of even local depletion. They are especially indicated in the œdematous variety. When the disease is chronic, the elongation of the uvula is often so considerable as to produce tickling and cough, with mucous expectoration, whenever the patient lies down. The source of the irritation in these cases has often been overlooked, and the patient has in consequence suffered long courses of medicine and other remedies aimed at the fancied pectoral diseases. The negative evidence of auscultation will often lead to an inspection of the throat, and the real evil be thus discovered. The enlargement of the uvula is sometimes caused by actual hypertrophy rather than by mere œdema. In such instances the best remedy is excision.

ANGINA MEMBRANACEA.

Description.—Two forms, the sthenic and the malignant.—Causes.—Nature.—Diagnosis.—
Treatment.

THIS species of angina is characterzied by the formation of albuminous pellicles on the surface of the inflamed membrane, whence it was named by M. Bretonneau of Tours "Diphtheritis" (διφθερα, *pellis*). The patches are of various extent, in mild cases white or ashy, separate, and presenting the appearance of superficial sloughs, for which they have often been mistaken; in others, dark-coloured, coalescent, and forming one uniform crust. The exudations may extend far down the œsophagus, or into the larynx, trachea, and bronchi, and upwards into the nasal fossæ. The membrane beneath and between the pellicles is in some cases of a bright red, in others purplish or livid. The exudations vary in density from that of coagulable lymph to that of a soft pultaceous matter.

The local sensations are similar to those of angina diffusa, with the addition of those produced by irritation and obstruction of the air-passages when the disease has extended in that direction. It is common also for the submaxillary and cervical glands to become inflamed and tumefield. The general symptoms are those of fever, and vary with the type of the latter, and the degree of the inflammation. When the patches are but few and circumscribed, the disease is often called *ulcerated sore-throat*, such as may be seen in scarlatina anginosa; but there are no ulcers in these cases, for on removing the pellicles, or sloughs as they are called, we find the membrane beneath quite free from any other disorganization than the loss of its epithelium. In the worst cases pellicles are discoloured by the admixture of bloody exudation, and vitiated secretions of the throat, so as to create an impression that the parts are in a state of sphacelus. These cases correspond to the angina maligna of many authors, and to the gangrenous angina of others; but we have the united testimony of Bretonneau, Guersent, and Deslandes, formed on extensive necroscopic observations, that there are no true eschars in these cases. The idea of gangrene existing has been further kept up by the discharge of serous fœtid matter from the nostrils, and by the putrid character of the fever. Instances of this description are very rarely met with, excepting when the disease prevails as an epidemic.

From the above remarks it may be gathered that angina membranacea appears in two forms. In one, the local affection bears the marks of active inflammation in the bright ʼhue of the mucous membrane, and in the white circumscribed exudations, unmixed with blood or sanies. The constitutional symptoms in this form are likewise sthenic, the pulse being full and firm, the skin warm, and the nervous system, though disturbed, not exhibiting the signs of prostration so common in typhoid fever. The other variety may well be called *angina maligna*. Its approach is often insidious, being attended with but little pain or distress in the throat till the false membrane is already extensively formed. Then the dysphagia becomes extreme, liquids are forced back through the nostrils, and symptoms soon occur denoting that the air-passages are obstructed ; such are a croupy cough, hoarseness, and stridulous breathing. The feeling of suffocation accompanying these symptoms is in part owing to the swelling of the lymphatic glands. On inspection of the throat we see a thick pellicle, sometimes dense, not unfrequently pultaceous, variously coloured according to the degree of its decomposition or to the accompanying secretions, and either continuous, or interrupted by fissures which exhibit the livid hue of the membrane beneath. The pulse is extremely rapid and feeble, delirium sets in early, and is soon followed by coma ; and the collapsed face and sunken eyes indicate extreme exhaustion. Death often takes place suddenly from the laryngeal complication. Bretonneau was led by the results of his dissections to attribute the death in all the fatal cases to the changes in the air-passages.

As might be expected *à priori*, the victims of the malignant angina are persons living in humid districts, where the disease is occasionally epidemic, the inhabitants of crowded buildings, and the poor ill-fed classes of the community. Persons, however, not under these depressing agencies, may be attacked by a severe form of the disease. Children are more liable to it than adults. In Picardy and Touraine the disease is all but endemial. In this country angina membranacea is far less frequent than on the continent. Whether it is propagated by contagion is not absolutely determined, but there are strong presumptions in favour of this view. When the affection is epidemic, the difficulty of distinguishing the operation of some generally diffused cause from that of contagion, meets us in this disease with the same force as in other epidemic maladies. The most unexceptionable instances of contagion are those in which the *sporadic* form has been transmitted from one person to another. Guersent relates the case of a nun who caught the disease from a little girl whom she had nursed in the Hôpital des Enfans, and he remarks that practitioners are frequently attacked after inspecting the throats of their patients.

Nature. That inflammation of the mucous membrane takes place in angina membranacea cannot be for a moment doubted, but why it should cause the secretion of coagulable lymph rather than of serum and mucus, which are the ordinary products of mucous inflammation, cannot easily be explained. It is probable, however, that the peculiarity does not depend upon the local action merely, but upon the state of the constitution previously modified by epidemic influences or by the unfavourable mode of life.

Diagnosis. 1. The fibrinous exudations in this disease, with the obstruction of the air-passages, has caused it to be confounded with croup, yet the diseases are very different. In the latter the inflammation is confined to the tracheal and bronchial membrane, while in diphtheritis the inflammation is seated in the fauces and pharynx, and only in severe cases extends to the larynx and trachea. True croup is rarely if ever attended with the low typhoid fever so common in angina membranacea, the symptoms of exhaustion in the advanced stage being clearly referrible to the impeded respiration.

2. Angina membranacea is with difficulty discriminated from angina gangrænosa, the affection described by Fothergill as putrid sore throat, the cynanche maligna of Cullen. The general and local symptoms are very similar, but in the latter disease the difficulty of breathing is attributable rather to the general

tumefaction than to any laryngeal complication, and there are true gangrenous sloughs, which, on separating, leave corresponding concavities in the tissue. On this point Fothergill speaks very distinctly, and where the disease is of the mildest kind a superficial ulceration only is observable, which may easily escape the notice of a person unacquainted with it. A thin, pale, white slough seems to accompany the next degree; a thick opaque or ash-coloured one is a further advance; and if the parts have a livid or black aspect, the case is still worse. These sloughs are not formed of any foreign matter spread upon the parts affected, as a crust or coat, but are real mortifications of the substance; since, whenever they come off, or are separated from the parts they cover, they leave an ulcer of a greater or less depth, as the sloughs were superficial or penetrating.

In this disease, moreover, there is frequently observed an erythematous or papular eruption on different parts of the body; and there can be little difficulty in arriving at the conclusion that it is a variety of scarlatina maligna. (See SCARLATINA.) We quite coincide with the opinion given by Dr. Tweedie, in the *Cyclopedia of Practical Medicine*, art. SCARLATINA. "We are inclined," he observes, "to affirm that the scarlatina simplex, scarlatina anginosa, and the scarlatina or angina maligna, and the sore throat without efflorescence on the skin, are merely varieties of one and the same disease." It is scarcely necessary to add that the *sore throat* here alluded to, is that which presents the same characters as are observed in cases where there is also the cutaneous affection.

Treatment. Abstraction of blood both from the arm and from the vicinity of the diseased part, may be requisite in cases which set in with active inflammatory fever, and which are to be treated, therefore, on general antiphlogistic principles. But the worst description of cases will not tolerate measures of this nature, and are exceedingly intractable under any plan. If the system can be speedily brought under the influence of mercury, the issue will generally be successful. This treatment, which was first practised at Tours by Dr. William Conolly, now at Cheltenham, is much commended by Bretonneau. Calomel may be given in two grain doses every second hour, or in smaller doses still more frequently. If the mucous membrane be irritable, we may administer the Hydr. c. Cretâ, and direct free mercurial inunction. If the pellicles have formed in the air-passages, very little expectation of recovery can be entertained. In cases attended with great prostration from the commencement, or when this state supervenes on the more active symptoms, we must have recourse to wine, ammonia, bark, and animal broths. In some cases we have thought that the combination of muriatic acid with dec. cinchonæ conduced materially to a favourable termination.

The local treatment is, to say the least, of equal importance with the general. Caustic applications are the most successful; Bretonneau strongly recommends the undiluted muriatic acid, applied by means of a sponge; but we have a far more manageable, if not more efficacious, remedy in the nitrate of silver, which may be applied in substance, or in a strong solution. It should be resorted to as soon as the false membrane is detected, or even before this is actually formed, if, from the prevalence of the affection, we have reason to think that the inflammation will become diphtheritic. Dr. Evanson has observed satisfactory results from a saturated solution of sulphate of copper. (*Op. cit.*) Blisters placed on the exterior of the throat, or on the nape of the neck, may be used as subsidiary measures, but must on no account supersede the internal applications. When the exudation of lymph has extended to the windpipe, we may attempt its detachment and expulsion by emetics, as in cases of croup.

ANGINA TONSILLARIS.

Superficial and deep-seated.—Symptoms.—Causes.—Treatment.

THE popular name of this disease, *quinsy*, is derived originally from *cynanche*, having passed through the several transformations of *esquinanche* (Fr.), *squinancy, squincy, quincy, quinsy*.

Inflammation of the tonsils assumes two forms, the superficial and the deep-seated. The former may be only a part of the angina diffusa, or it may be limited to the surface of the tonsil, in which case the inflammation usually dips down into the interior of the follicles of which the organ is composed; but in the common tonsillitis, the vessels in the body of the organ, most probably in the interfollicular cellular membrane, are the seat of the disease. The inflammation is phlegmonous, and disposed to suppuration.

The symptoms of angina tonsillaris are a sense of fulness in the throat, pain, and difficulty of swallowing, heat and dryness of the fauces, and shooting pains in the ear. The voice has a croaking sound, which will often be quite sufficient to indicate the disease. On inspection of the throat, we see the isthmus faucium considerably narrowed by the projection of one or both amygdalæ, and the surrounding parts more or less swollen, and covered with viscid mucus.

The great vascularity of the tonsil will account for the rapid increase of bulk under the inflammatory turgor. In severe cases, the swelling is so considerable as to press upon the epiglottis and impede the breathing.

The state of engorgement may continue several days, and at last terminate by resolution, or it may pass into passive congestion. When the inflammation continues active from the commencement, we may look for suppuration. This termination is often announced by throbbing in the part, and slight rigors. The distress produced by a large abscess in the tonsils can scarcely be surpassed in any disease. The fever accompanying this form of angina is often more active than might be expected from inflammation of an organ of comparatively little importance. The carotids and other arteries in the neighbourhood of the diseased part, pulsate with great force.

Causes. No peculiar predisposition seems to be required for the production of tonsillitis. It occurs among the most robust and healthy. The most obvious exciting causes are sudden changes in the temperature, and humidity of the atmosphere, exposure to cold when the body has been heated, currents of cold air, wet feet, &c. Persons who have once suffered an attack of the disease, especially in its suppurative form, are more liable to a recurrence of it.

There is no difficulty in the diagnosis, and we may generally prognosticate a favourable issue of the case. Death may result in enfeebled habits from the difficulty of conveying nutriment into the system; and when there is a large collection of pus, from pressure on the larynx. But such a termination in the latter instance may be almost always averted by art.

Treatment. If the case be seen at the very commencement, it will not unfrequently give way to the operation of an emetic. But we seldom have it presented to our observation before the inflammation has acquired sufficient activity to demand the free application of leeches. In vigorous subjects, a general bleeding will accelerate the cure. Brisk purgation by calomel and jalap or senna should follow the abstraction of blood. Saline cathartics are indicated from their antiphlogistic property, but the patient has great difficulty in swallowing them. Antimonial diaphoretics may be given at bedtime, but the com-

fort of the patient requires us to be as sparing of medicines by the mouth as the necessity of the case will admit of.

Incisions or scarification of the tonsils, though much extolled by some practitioners, have appeared to us to produce only a temporary relief to the state of engorgement. When pus has formed, the sooner it can be evacuated the better. Fluctuation should be felt distinctly before using the lancet, as premature attempts at letting out the pus occasion disappointment to the patient, and indispose him to the operation when it is more likely to be successful.

The progress of the suppuration may be encouraged by external fomentations and poultices, the inhalation of steam, and a gargle of warm water : the latter applications are very grateful even in the earlier stage. Although it is expedient to hasten suppuration when it has once commenced, we should do all in our power to prevent such a termination, and the best means for attaining this object are leeches and evacuants. Rubefacient embrocations and blisters may be used after leeching has been carried as far as appears desirable. We cannot say that discutient gargles are of service, except in chronic cases, or in those in which the inflammation partakes of a passive character.

HYPERTROPHY OF THE TONSILS.

An indolent enlargement of these organs, without pain, heat, or increased redness, may be referred to hypertrophy. It is not an uncommon result of repeated attacks of acute inflammation, or of inflammation chronic from the commencement. In strumous habits it appears to be all but congenital. The augmentation of size is sometimes so great as to produce constant inconvenience in swallowing and speaking. Various methods have been resorted to for reducing the swelling ; such as repeated leeching, scarifications, blisters, astringent gargles, mercurial and iodine unguents ; but with such partial success that the extirpation of one or both tonsils has been after all required. We have seen most benefit from the daily application of nitrate of silver, either in lotion, or in substance. We learn from Dr. Graves (*Dublin Journal*, Jan. 1839), that Mr. Cusack has been very successful in reducing these tumours, by applying the solid lunar caustic to successive portions of the surface, so as to produce an eschar at each application. This is done by pressing the caustic firmly upon the part, instead of lightly touching it, as in the ordinary mode of application. A cure by this method cannot be expected in a shorter time than six months.

DISEASES OF THE ŒSOPHAGUS.

Structural disease of the œsophagus.—Spasmodic stricture.—Symptoms.—Diagnosis.—Treatment.

THIS portion of the alimentary canal is remarkably exempt from acute diseases,—an indemnity which may be owing in part, to its organization, which, besides being less vascular than in many other portions of the tube, is defended by a thick epithelium, and partly to the rapid passage of the alimentary substances, whereby those which have any irritating property are but a short time in contact with its surface. Inflammation may be excited in the œsophagus by acrid poisons ; such as the concentrated acids and alkalies, corrosive sublimate, oxalic acid, &c. ; or it may occur independently of direct irritation, as a continuation of disease from the fauces and pharynx. Thus it has been already remarked, that diphtheritic angina frequently extends to the œsophagus. But idiopathic inflammation commencing in this part, is we imagine extremely rare,

inasmuch as authors are silent upon the subject, and we have never met with an instance of such disease.

The most important chronic diseases of the œsophagus are alterations of structure, producing an impediment to the passage of food. These causes of stricture may be arranged in three groups. 1. Hypertrophy of the submucous cellular tissue consequent upon chronic inflammation. 2. Carcinomatous disease in the form of dense scirrhus, or of encephaloid tumour. 3. Compression from tumours in adjoining parts, such as enlarged cervical glands, and aneurism of the carotid artery, or of the aorta. For further information respecting organic stricture of the œsophagus, we must refer the reader to works on surgery.

Spasmodic stricture of the œsophagus is characterized by difficulty of swallowing, the impediment being generally felt in the pharynx, or upper part of the œsophagus, and accompanied by a distressing sense of fulness and choking. The food may descend after some struggle in the part, or it may be instantly ejected. In many cases it matters very little whether the substance is solid, or liquid, in large quantity or small, the mere contact of it with the surface of the passage being sufficient to provoke the spasmodic constriction. In some instances, fluids have been transmitted with more difficulty than solids. The affection is sometimes paroxysmal, and may be accounted for by violent emotions, or by temporary disorder of the stomach. In other cases it continues for months, and even years. In one person the dysphagia is attended by increased sensibility, and even pain in the part affected, in another this is not the case. The complaint often disappears as suddenly as it came, and does not return. In other instances it gradually wears out like many other affections of a similar nature.

The most frequent subjects of this disorder are persons of the aneurotic diathesis; especially hysterical and chlorotic females, and those who have suffered from exhausting maladies. We have known it occur in women who have become anæmial from uterine hæmorrhage, or from large bleeding. It is not confined, however, to females. It has been met with in persons suffering from dyspepsia and torpor of the colon. Contiguous irritation, as from ulceration of the larynx, may give rise to the affection. A case of this kind is related by Mr. Mayo (*Outlines of Pathology*, p. 280). It is not improbable that excrescences from the mucous membrane might produce irregular contraction, in a manner analogous to what occasionally takes place in the rectum.

The *diagnosis* of this complaint from organic stricture, is of vast importance with reference both to the prognosis and to the treatment. When it occurs in paroxysms there can be no difficulty in deciding that there is no structural impediment, but the permanent cases are more open to doubt. The introduction of a bougie will often suffice to remove any apprehension of mechanical obstruction; but its passage may be arrested merely by the spasm which its presence has excited. In some cases we shall find upon close inquiry that the part has been occasionally taken by surprise, as it were, and portions of food swallowed unawares, which could not have happened had there been a real obstacle. The sudden supervention of the disorder, its being accompanied by hysterical ailments, or alternating with them, the anæmial state of the patient, an age at which carcinoma does not usually occur, and the absence of the general signs of the cancerous diathesis, or of previous inflammation in the part, are considerations which may severally, or together come in aid of our judgment.

Treatment. The indications are, 1st, to lessen the morbid irritability in the œsophagus, and 2d, to correct the general predisposition, or that morbid condition in other organs with which this disorder is sympathetic. In fulfilment of the first intention, we may direct cold sponging and friction of the neck; the application of a blister, or a rubefacient liniment to the nucha, and antispasmodic medicines; particularly the fetid gums, camphor, castor, and valerian. The endemic use of morphia, or belladonna, may be tried in obstinate cases. The bougie should be frequently introduced for the purpose of habituating the part

to stimulation, and thus diminishing its morbid susceptibility. It must be allowed, however, that in some patients this operation is productive of too much excitement to encourage its continuance, and we must then rely upon sedatives, antispasmodics, and the measures appropriate to the accomplishment of the second indication.

2. In cases of debility, from previous illness or other causes, our object will be to restore the strength of the system by a nutritious or even generous diet, a change of air, and the use of tonic medicines. The peculiar irritability of the nervous system in hysterical subjects must be lessened by the use of the shower bath, frequent exercise in the open air, a course of chalybeate medicines, regulation of the catamenial function, a firm but unstimulating diet, abstinence from tea and coffee, and the avoidance of modes of life calculated to excite or relax the nervous system, such as late hours, dissipation, excessive mental exertion on the one hand, or addiction to mere imaginative reading on the other. (See HYSTERIA.) When the disorder can be traced to irritation in the digestive system, the treatment of the former must obviously be secondary to that of the latter.

GASTRITIS.

Anatomical characters of congestion and Inflammation of the gastro-enteric membrane.— Redness—Forms of.—Cadaveric.—Physiological.—Morbid.—Congestive.—Inflammatory.— Brown colour.—Slate-gray, black.—Inference from the absence of morbid colourings.— Softening.—Induration.—Hypertrophy.—Ulceration.—Effusion.—Symptoms of acute, subacute, and chronic gastritis.—Anatomical characters.—Causes.—Treatment.

THOUGH the term Gastritis in its strict acceptation implies inflammation of all the tunics of the stomach, it has been generally restricted to inflammation of the internal or mucous lining of the organ, the other tunics becoming in some instances involved, according to the nature and intensity of the exciting causes or the duration of the primary disease. Before detailing the symptoms of gastric inflammation, we shall give a brief account of the *anatomical characters of congestion and inflammation of the gastro-enteric membrane generally*, reserving for description in their proper places the appearances which belong to its several divisions.

Redness is a character appertaining equally to congestion and to inflammation. It cannot, therefore, enable us to discriminate these conditions; but in distinguishing cadaveric congestion alike from morbid congestion, and from inflammation, we shall derive much assistance from observing the forms and shades of the colouring. First as to the *forms* which it assumes : if the accumulation of blood is confined to the capillary network, the redness is diffused, and is called the *uniform* redness; when caused by vital congestion, it is for the most part of a vivid hue; when the smallest veins and arteries are likewise injected, the appearance is called *capilliform* or *arborescent;* the term *ramiform* injection is applied to cases in which the larger trunks are distended. When the redness is *punctiform*, separate villi are usually the seats of it, though the same dotted appearance is sometimes caused by minute circles of redness corresponding to inflamed follicles; when from the dots the colour radiates in fine lines, it is said to be *stellated*. This last is obviously a compound of the punctiform and capilliform varieties. The above appearances result from the blood contained within the vessels. The redness which occurs in stripes or patches, with no intervals of a paler hue, though it may be a circumscribed instance of the uniform species, is often caused by ecchymosis; whether it shall be accom-

panied by elevation of the surface, depends on the circumstance of the hemor-
rhage occurring in the villi, or in the submucous cellular tissue.

Any one of these forms of redness may result from *post mortem* agency, or
from causes in operation at the very time of death, viz., a mechanical obstacle
to the return of the blood, or gravitation. But the uniform and punctiform
redness, if so produced, will be attended by the capilliform or ramiform, because
in these instances the cause acts not on the blood of the capillaries, as during
life, but on that of the trunks. In estimating, therefore, the value of redness,
as a sign of disease in the mucous membrane of the alimentary canal, we must
particularly attend to the state of the venous system, and to the situation of the
redness with reference to the position of the body. The condition of the vena
portæ is of the greatest importance, and therefore it is a good rule to make a
point of ascertaining the state of this vessel, as to fulness, before proceeding to
lay open the canal; if it be not more distended than usual, we may feel satisfied
that venous obstruction was not the cause of the redness. In like manner, if
the redness is found in parts which are not dependent, we may dismiss the idea
of gravitation.

Cadaveric redness generally occupies a very considerable surface, and if
unmixed with morbid redness is not concentrated in particular spots; it is
diffused over the part which it affects, and which will be found to be in the most
dependent situation.

Having determined that the congestion was not cadaveric, we must inquire
whether it was morbid or physiological. It is well known that during the
process of digestion, more blood is determined to the mucous membrane than
at other times; therefore the stomach of a person who had died shortly after a
meal may be expected to exhibit redness. The same rule applies to a certain
extent to other parts of the tube, the emptiest being *cæteris paribus* the least
vascular. The kind of food must be taken into consideration, as to its stimu-
lating quality, and we must inquire whether cordials had been administered
recently before death. In numberless instances we have satisfied ourselves that
the vascularity was caused by brandy or ether taken in the last hours of life.

The age of the individual produces important differences in the natural colour.
Thus, as Billard has observed, in the fœtus and infant it is rose-coloured; in
children, of a milky or satin-like appearance; in adults, of a slight ashy colour,
especially in the duodenum and beginning of the ileum; and in elderly persons,
still more decidedly ashy.

From what has been stated, it is clear that redness is least equivocal as a
morbid sign when it is confined to circumscribed portions of the capillary net-
work; when it occurs in situations where gravitation would produce a contrary
state; when there is no remarkable fulness of the portal veins; and when there
is no evidence that the digestive function had been active just before death, or
that stimulant potions had been recently taken. But it must be well known to
all who have had much experience in *post mortem* examinations, that such a
concurrence of circumstances is very rare; that the combined influence of
gravitation and of mechanical obstruction occurs in a vast number of cases,
and that their effects are complicated with those of disease, which they may
heighten for obvious reasons. But if morbid redness accompanies the cada-
veric, it will be found in some situations where it cannot be accounted for by
such causes; for instance, although we might be in doubt respecting a patch of
dull redness in the posterior region of the stomach, we have no difficulty in
referring a punctated or arborescent redness in the anterior surface to a vital
process. In determining whether though vital, it was normal or morbid, we
must consider the circumstances which have been mentioned respecting age
and the contents of the stomach; thus, before pronouncing the redness to be
morbid in a very young subject, we must be sure that the hue is more intense
than natural, and further that it is not an equable suffusion of the membrane,
but belonging to the punctiform and capilliform varieties. The form of vital

congestion most difficult to distinguish from the cadaveric, is obviously that which depends on the same causes as the latter; viz., the passive congestion, which occurs in states of great debility, or in cases of preternatural fluidity of the blood. But, as Andral observes, the passive hyperæmia, which is left after long continued irritation, and which is confined to the larger branches of vessels which had not recovered their natural contractility before death, is not so readily confounded with the pseudo-morbid species.

Having ascertained that the redness is the effect of disease, we might next inquire whether this was congestion or inflammation; but the question is not to be resolved by the character of redness, which depends merely on a condition common both to congestion and inflammation, viz., a preternatural quantity of blood in the capillaries. It might be presumed that as inflammation differs from congestion in the fact that the blood is stagnant in the former, its redness would be sufficiently distinguished by its permanency; but although in congestion the blood may not have been stagnant during life, its coagulation after death may imitate the characteristics alluded to. Redness is said to be permanent when it is not removed from a tissue by pressure, or by ablution, or by suspension in a vertical position; but there are other means of ascertaining inflammation.

The other colours indicative of congestion and inflammation are the *brown*, the *slate-gray*, and the *black*. They are characteristic of chronic disease, and are, on the whole, much less easily imitated by cadaveric changes than redness; for the plain reason, that they require a longer time for their production. These shades are all owing to stagnation of blood in the capillaries, and to the changes which it undergoes, either by the loss of its serum, and consequently of its saline particles, or by the chemical action of the substances in contact with the membrane. The effect of acids, including sulphuretted hydrogen, in darkening the hue of the blood when extravasated is well known, and is exemplified in the evacuations peculiar to malæna. A similar action may occur in the textures, but most frequently in the stomach and cæcum, because a liquid acid is continually secreted in these parts; and, accordingly, these are the portions of the canal which oftenest present the brown and slate-gray tints. The dark crimson and black, depending often on mere stagnation of the blood, may be observed in every part of the canal, the former very commonly in the lower extremity of the ileum. We may remark, that some varieties in the forms which these colours present, such as the dotted and striated black, are caused by partial hæmorrhage in the mucous membrane.

Before dismissing the morbid colourings of the gastro-enteric membrane, we must consider the following question:—Does the absence of any of these appearances prove that no vascular disease of the part existed during life? As it regards inflammation the answer must be affirmative, because, if the blood had stagnated and coagulated in the capillaries, it cannot be removed by any forces which operate after death, short of actual decomposition. But the same cannot be said of mere congestion; and we believe it to be by no means uncommon for an intense congestion to disappear shortly before or after death in consequence of revulsion, or of hæmorrhage, or of serous effusion. Thus, a severe determination to the bronchial membrane in the last hours may remove the disease from the intestines; or a large quantity of blood or serum may have been voided by stool, leaving the membrane which furnished the fluid nearly pale.

Softening. Before pronouncing upon the value of this change as a sign of disease, we must be aware of the different tenacity of the healthy membrane in different parts. Thus, although it may be raised by the forceps in considerable flakes from the pyloric end of the stomach, and from the rectum, it readily breaks and tears in the other parts of the canal. In the duodenum and jejunum the disposition of the membrane in the valvulæ conniventes prevents it from being separated in large pieces. For the most part, the firmness is in a direct

ratio with the thickness. The relative thickness of the membrane in its different parts, according to Billard, observes the following order; 1, duodenum: 2, pylorus: 3, cardia: 4, rectum: 5, jejunum: 6, ileum: 7, colon.

Preternatural softness may be cadaveric, as in the stomach from the action of the gastric juice; and in other parts, from imbibition of the blood in pseudo-morbid congestion, or from putrefaction. Morbid softness may also be caused by a similar infiltration during life, or by extravasation of blood into the substance of the membrane, as in what is sometimes called hæmorrhagic softening, and may have been preceded by mere congestion. Such kinds of *ramollissement* will be distinguished by the hue of the membrane. When softening has been preceded by chronic inflammation, it may be of a brown or even of a white colour. The latter is not uncommon in chronic diarrhœa, the villous coat of the large intestine being found white and pulpy, and easily denuded by the nail, or the handle of the scalpel.

Induration. This alteration is more common in the subjacent cellular membrane than in the mucous coat, and indicates inflammatory disease of some standing, as in chronic dysentery. But the mucous membrane itself may be firmer than natural, though it is nearly always at the same time hypertrophied. As the firmness is judged of by the ease with which portions of the mucous may be separated from the other coats, it must be borne in mind that a fallacy in this respect may result from the unnatural softness of the submucous cellular tissue, which must obviously facilitate the stripping operation.

Hypertrophy. This is one of the most striking characters of chronic mucous inflammation. It may be confined to the villi, producing velvety, or fungoid elevations; or to the follicles and glandulæ agminatæ, assuming the appearance of warts, or patchy excrescences.

Ulceration. This lesion, in a vast majority of instances, is a sign of previous inflammatory action (most frequently of the chronic kind), and occurs in a great variety of forms. It may be confined to the villi or to the follicles simple or agminated; or it may reach the muscular coat, and even penetrate the peritoneum. The characters of ulceration in different parts of the tube will be described hereafter; we now content ourselves with remarking that, in the stomach, it is very rarely the result of acute inflammation, but, in the intestines, such a consequence is by no means infrequent.

Effusion. An increase of mucous secretion confirms the evidence of inflammation afforded by vascularity. The opposite state of dryness is a scarcely less valuable sign, indicating an earlier period of inflammation. Blood mingled with the mucus affords, if possible, still stronger proof. But hæmorrhage alone, whether on the surface or into the tissue (such as produces maculated and striated ecchymosis) may betoken inflammation or simple local plethora; though it may likewise result from mere mechanical congestion, or from a morbid fluidity of the blood. Fibrinous matter is not often detected upon the free mucous surface; it is, perhaps, not unfrequently overlooked from being confounded with shreds of mucus. When secreted in the mucous or submucous tissue, it causes thickening and induration. It is almost superfluous to add, that the evidence afforded by pus is unequivocal. This secretion is generally found on the surface of ulcers, but it may also occur where there is no marked abrasion of the villous coat.

The symptoms of gastritis vary according as the disease is acute, subacute, or chronic.

1. *Symptoms of acute gastritis.* This disease being almost exclusively the result of irritation from substances taken into the stomach, has no *precursory symptoms* of which we could speak with any degree of precision. One of the earliest symptoms is intense pain in the epigastrium, with a peculiar feeling of distress, extending under the sternum, and often to both hypochondria. It is frequently accompanied by a sense of burning, which may also be felt along the œsophagus. The slightest pressure aggravates the suffering; and the same

effect is produced by inspiration, swallowing or vomiting. The latter affection is to the last degree distressing, and alternates with the most deadly nausea and retching. The matters vomited, at first chymous or bilious, afterwards consist of little more than mucus stained with sanguinolent or sanious matter. An unquenchable thirst, with longing for cool drinks, which the stomach is seldom willing to retain for a minute, adds to the tortures of the patient. The local signs are a fulness of the epigastrium, and a great increase of heat perceptible to the hand.

The extreme prostration of which the patient complains is denoted by the sunken altered countenance, the paleness, and the cold clammy extremities in the advanced stage, and in some very rapid cases almost from the beginning. In others the face, though expressing great anguish, is, in the earlier hours, flushed, and the skin hot, dry, and harsh. The pulse is frequent, and small, for a short time resistent, but soon becoming weak and thready. If the irritation is confined to the stomach, the bowels are constipated. The urine is scanty and high coloured. The tongue is for the most part redder than natural, and covered in the middle with a thick flaky fur.

These and other symptoms vary with the nature of the exciting cause; and for an account of such varieties, we must refer to the treatises on poisoning.

The disease most likely to be confounded with acute gastritis is peritonitis, which resembles the other in the intense pain, the vomiting, and the symptoms of prostration; but the diagnosis may be indicated by the situation of the pain, which, in peritonitis, is diffused over the lower parts of the abdomen, instead of taking a direction towards the thorax, by the peculiar thirst, the sense of burning in the epigastrium, the aspect of the tongue, and the mucous nature of the matters vomited.

The disease, if it does not terminate in death in a few hours, or by the second or third day, may extend to two or three weeks, and still prove mortal; or it may pass into chronic gastritis of indefinite duration. Death in the rapid cases is produced by depression of the vital functions, particularly the circulation, apparently from the close sympathy between the heart and the diseased viscus.

2. *Symptoms of subacute gastritis.* This is far more common than the acute variety, being a frequent accompaniment of disease in other organs, and not less often supervening upon the chronic form. The symptoms are pain or uneasiness in the epigastrium, with tenderness on pressure, anorexia, nausea, sometimes vomiting, a sense of distention, flatulence, eructations, thirst, and dryness of the mouth. The tongue is generally red at the tip and margin, and sometimes over the whole surface, with elevated papillæ. The pain in the stomach is excited or aggravated by solid food, and stimulating or warm liquids. Many anomalies, however, occur in this respect. We have known persons able to take portions of brandy and water without uneasiness, while warm tea or coffee would immediately bring on the pain. The bowels are sluggish, the skin is dry, and the urine high coloured. The sympathetic disorders are feverishness, headache, particularly over the forehead, cough of a hard paroxysmal character, and pains in the limbs. Sometimes these morbid sympathies are so intense, as to supersede or to withdraw attention from the local symptoms. When the gastritis supervenes on disease in other organs, instead of acting revulsively, it more frequently aggravates them; it is one of the most serious additions to the sufferings of a phthisical patient. The countenance has nearly always a distressed irritated expression, the cheeks are suffused with a circumscribed redness, the lips look dry and parched, the eyes suffused, the lids turgid, and the tarsi sore.

Nothing can be more variable than the duration of this form of gastritis. If ascertained at an early period, it may soon give way to the appropriate remedies. But very commonly it escapes attention until it has become chronic, and then it is far less easily coped with. As the disease is so commonly masked by the

remote affections which it calls into existence, it is not surprising that the diagnosis is often difficult.

3. *Symptoms of chronic gastritis.* The local symptoms differ little in degree from the form just treated of; but they are more variable, and are complicated with a greater variety of sympathetic affections. Sometimes they are very marked; thus the pain may be severe and uniformly brought on by ingesta, and the tenderness constant. The vomiting is often accompanied by the discharge of a colourless glairy fluid, or of mucus in large quantity. Sometimes instead of pain, there is a gnawing or raking sensation in the stomach, a feeling of fulness, or something hard or heavy pressing upon the epigastrium. The gnawing sensation in some persons, suggests the idea of a living animal enclosed in the stomach. A feeling of vacuity or sinking, is often a source of great distress to the patient, and though it prompts him to take food or a cordial, he is little relieved by it. The appetite is irregular; now there is an utter disgust for food, and now a morbid craving; the articles selected being of the most inappropriate description. The taste is often vitiated, so that every thing has lost its proper, or acquired a new flavour. After food has been swallowed, a feeling of bitterness is sometimes left, with watering of the mouth; sometimes acidity. Bread, biscuit, tea, even water will leave this impression on the palate. Instead of acidity, the patient sometimes complains of a sensation in the stomach cognate to it, which is called heart-burn. Flatulence, and eructations of fœtid gas, or acrid secretions, sometimes take the place of, or are added to the other symptoms. Palpitation, pulsation of the epigastrium, pain between the scapulæ or in the hypochondria, are among the most common sympathies of contiguity. The action of the intestines is generally torpid, and the appearance of the stools often indicates that the liver is disordered, but by no means constantly. The urine is either of a dark brandy colour and clear, or of a lighter hue, but turbid, —often it is covered with an iridescent film,—occasionally it is passed with difficulty. The skin is for the most part harsh and branny, and frequently affected with papular and squamous diseases. The tongue may appear healthy, but more commonly its hue is one of a deep red. The fur is often in patches, giving it a variegated aspect: even when the two anterior thirds of the organ are clean, the posterior may be thickly coated. Sometimes instead of a decided crust, there is a viscid glutinous mucus clinging to it. Its surface is commonly either preternaturally smooth and shining, or presents fissures of the epithelium. The gums look spongy and unhealthy. The follicles at the base of the tongue are swollen, and the whole surface of the posterior fauces is more injected than natural. The lips are sometimes chapped, and a similar condition may be noticed at the margin of the nares.

Feverishness alternating with chilliness, is often complained of, especially at night. The pulse has nothing characteristic; in some persons it is steadily slow, in others, frequent and irritable; in this patient intermittent, in that, irregular. The morbid sympathies are endless. Those of the duodenum, and the biliary apparatus might be well expected, but they are often less marked than in organs more remote. Perhaps no system is more frequently and deeply involved than the nervous. Headache, confusion of thought, inaptitude for mental exertion, sleeplessness or distressing dreams, dimness of sight, muscæ volitantes, pain in the eyeballs, preternatural acuteness or dulness of hearing, noises in the head, pains in the back, the sides, the limbs, sometimes amounting to neuralgia, numbness, impairment of muscular power, locally or generally, unwonted sensations in parts of which we are generally unconscious, alterations of the natural feelings, tremors, spasms: irritability of temper, morbid gloom, entire occupation of the mind with bodily feelings, hallucinations: these are but a scantling of the myriad disorders of thought, sensation, and motion to which the patients alluded to become a prey. The thoracic organs are likewise affected; presenting bronchial irritation, dyspnœa, asthma, and a cough well known as gastric, and distinguished by its hard sounding spasmodic character,

with the absence of sufficient disease in the chest to account for it. We have already spoken of palpitation and irregularity of the pulse; the former is some-times accompanied with pain under the sternum, and in the inside of the arm, imitating *angina pectoris*. In the genito-urinary system we meet with dysuria, spasm of the urethra, nephralgia; in the male, shooting pains in the testicles, psoriasis of the glans penis; in the female, menstrual irregularities, leucorrhœa, prurigo pudendalis, &c.

We have seen that the secretions are altered and diminished. Textural nutrition for a time may appear little affected, but when the disease has existed long, this effect becomes manifest enough in the general emaciation, and in the unhealthy complexion. There is evidence, moreover, that it is changed in kind as well as in degree, from the organic diseases which are apt to supervene. A sufficient cause for this might at first appear to be found in the faulty elabora-tion of chyle and consequently of blood; but there are probably direct morbid sympathies between the diseased stomach and the nutrient actions. This would seem indicated by the unhealthy aspect which ulcers and wounds are apt to assume, and, upon analogy, by the depraved secretions.

The symptoms which we have enumerated constitute a form of *dyspepsia*, or inflammatory indigestion. Some authors consider dyspepsia as always depend-ing upon an inflammatory or a congested state of the mucous membrane of the stomach. This, however, we consider to be a narrow view of the subject, and long observation has led us to believe in the existence of a purely functional disorder of the stomach, that is, uncomplicated with any structural alteration, or with appreciable permanent disease of the capillary circulation. Of almost every other organ, the same remark obtains, certainly of the brain, the lungs, the liver, and the kidneys. But while we maintain that the collective symptoms resulting from chronic gastritis constitute only one form of dyspepsia, we con-cede the difficulty in a great many instances of pronouncing a similar set of symptoms to be independent on such a state of the mucous membrane, and also that great errors in practice are committed every day by overlooking this fre-quent cause of a disorder, which by many is treated as if it were always func-tional. Let us endeavour to point out one or two features more especially characteristic of the cases in which an inflammatory condition prevails. Pain, spontaneous, or occurring after food, may depend on mere increase of sensi-bility. It is often concluded that the pain is not inflammatory if relieved by stimulants and carminatives; but this is not decisive, for reasons which will appear when we discuss the treatment, though in the majority of cases of gastritis, the pain would be aggravated by such means. We have found a better test in the effect produced by hot liquids, such as tea, or plain water, which seldom fail to aggravate or induce pain in these cases. The existence of tenderness at the epigastrium, will confirm this evidence, but cannot be alone relied upon. The state of the tongue used to be thought one of the strongest diagnostic signs, but it is liable to great fallacies, Andral (*Clin. Méd.* t. iv.) and Louis (*Gastro. Ent.*, t. ii. p. 64,) have proved that gastritis may co-exist with a moist clean tongue of natural colour; and, on the other hand, that this organ may be red, papillated, or even aphthous, with a healthy state of the stomach. Still in a large proportion of cases, such alterations of the natural appearance of the tongue as we have enumerated among the symptoms, are observable, and should at all events lead us to suspect the disease. The state of the skin is an important help to us; thus squamous and papular disease, co-existing with stomach disorder, intimates very strongly that the mucous mem-brane is inflamed. The relief afforded by antiphlogistic means, affords some useful hints; but it must be valued only in connexion with other signs. We may remark, however, that relief ensuing upon iced drinks, is more decisive than when produced by local depletion, for the latter will sometimes mitigate a purely nervous gastralgia. The nature of the matters vomited is a valuable indication. For example, it is improbable that a large quantity of mucus

should be secreted, unless the membrane had been previously in a state of plethora.

Death from chronic gastritis may be caused by the general exhaustion, consequent both upon the long-continued irritation of so important an organ, and upon the impairment of the nutritive function. In most cases, however, the fatal event is brought about by some of the complications of the disease; more particularly those occurring in the liver, the kidneys, and the lungs.

Anatomical characters of gastritis. We have now only to point out those modifications of the appearances already described, which are peculiar to the stomach. When this organ has been violently inflamed, it is generally found contracted, and the mucous membrane so wrinkled as to present the honeycomb appearance. In different parts, the form of the red injection varies. In the fundus the redness is more uniform, the villous coat has a swollen appearance, and the larger trunks of the vessels are more loaded; while on the anterior and superior surface, we meet with the finer distributions of redness, the capilliform, the punctiform, and the stellated; the intervening membrane, however, being of a more rosy hue than natural. The colour also in the latter situations is more vivid. On the borders of the elevated rugæ it is not uncommon to perceive spots and stripes of ecchymosis; these we have noticed in animals poisoned by arsenic, and in parts of the stomach where gravitation could not have favoured the congestion. In some cases the blood is extravasated in the submucous tissue, presenting the appearance of black watery excrescences, particularly insisted upon by Dr. Christison as indications of poisoning by certain irritants. In less intense degrees of inflammation the redness and vascularity are more circumscribed, and the surface of the stomach is less puckered.

Chronic gastritis may be easily recognised by the hypertrophy of the mucous tissue, and by the brown, slate-gray, and chocolate tints. The last-mentioned, however, must not be confounded with the violet colour of congestion from venous obstruction,—an appearance very common in persons who die of disease of the heart. We must also take care to distinguish the effects of the gastric juice on the blood in the veins, from true pathological appearances. In the former case we find in the fundus of the stomach, just where the gastric fluid gravitates, dark sooty lines, which are easily recognised to be veins, while the interjacent membrane has a dull pearly aspect, sprinkled with points of the same sooty hue, and often a pulpy consistence. Dr. Carswell's researches have established beyond all doubt that these appearances are caused by the chemical action of the gastric acid, and that they may be produced after death. It is true that the brown tint of chronic inflammation may depend on an alteration of the colouring matter of the blood from the same cause; but in this case the matter is incorporated with the tissue from an action evidently of long standing: the appearance is not confined to the fundus of the stomach, nor is the part traversed by the large trunks of veins above described; and the membrane instead of being softened may be firmer than natural. Lastly, it must be remembered that the appearances of a *post mortem* action of the digestive acid, and those of chronic inflammations, are frequently combined. And indeed the quantity of blood accumulated in the membrane by the inflammatory process will favour the former appearance by supplying materials for its production. Such a combination will be detected by observing the state of the membrane adjoining the fundus.

Both in acute and chronic gastritis the follicles are generally more developed than usual. In the former, as we have observed, they not unfrequently present the appearance of red spots, or of small red circles. In the latter they are sometimes so much enlarged and elevated, as to produce what has been called the mammellated appearance. In other cases this would seem to depend on hypertrophy of the villi. Ulceration is nearly always the effect of chronic gastritis, excepting in cases of irritant poisons.

Causes of acute gastritis. A person in health is perhaps more secure from an invasion of this disorder than of any other acute malady; that is, the more

common causes of disease, such as cold, damp, fatigue, &c., rarely if ever induce it. When the disease can be at all referred to such agency, we shall find that the patient had been previously labouring under the chronic form. Its causes, then, may be said to be such as act, not through the general system, but by a direct operation on the stomach itself. The most prominent of these are the poisons called *irritants;* comprehending substances which act chemically upon the tissue, as the concentrated mineral acids and alkalies, oxalic acid, and corrosive sublimate; those which excite inflammation without producing any chemical action, as arsenic, salts of copper, and acrid vegetables: mechanical irritants swallowed, such as pieces of glass and metal; mechanical injuries, such as blows, wounds, &c. Some articles of food, or substances not at all capable of irritating a healthy stomach, or under ordinary circumstances, may be decided irritants; a draught of cold water, for instance, during exhaustion from violent exercise. We have known very severe gastritis induced by cider, or subacid beer, in persons previously liable to disorder of the stomach. Fruits and crude vegetables may have a similar effect.

Causes of subacute gastritis. This common accompaniment of other diseases may be generally traced to errors of diet, to exposure to cold and damp, to fatigue, mental excitement; these causes being rendered operative by previous or concurrent indisposition; as in convalescence from fevers, in phthisis, rheumatism, and gout. In the two last mentioned diseases it is apt to alternate with inflammation in other organs. The most common predisposition, then, is produced by other diseases. Of the different ages, we have no doubt that infancy is the most liable, for the obvious reason that the mucous membrane is not fitted for the variety of aliments which are often applied to it, and of which it becomes tolerant, only when the teeth have emerged.

Causes of chronic gastritis. This disease, as we have already observed, is often the consequence of the subacute variety, and depends on the same kind of causes. Alcoholic drinks, indigestible articles of food, excess as to the quantity, and too great frequency in the times of eating, are the most common exciting agents. A dry sea air has been often known to induce the disease, most probably through its action upon the skin. Persons engaged in occupations which oblige them to maintain a stooping posture for several hours in the day, such as shoemakers, tailors, clerks, &c., are very liable to disorders of the stomach, dependent on chronic congestion or inflammation. The mere sedentariness of the employment would in some measure account for the predisposition which it occasions; but we must not lose sight of the impediment to the venous circulation produced by want of free action of the diaphragm. The venous obstruction, caused by valvular lesions of the heart, and chronic diseases of the lungs, induces a similar tendency.

Treatment of acute gastritis. If poison has been taken, the first object is to remove or to neutralize it; but we refer to works on toxicology for the specific treatment required by different kinds of irritants. The severity and rapid progress of this disease would appear to call for the boldest application of antiphlogistic measures: but before resorting to them we must bear in mind two important circumstances: 1st, that many of the causes of the malady have a specific depressing influence on the heart and the nervous system; and 2dly, that when acute has supervened upon chronic gastritis, the system is too much debilitated by the previous malady to bear the same activity of treatment as would be appropriate to a purely recent disease. The causes then are rare in which we shall find it needful to push general bleeding far. One venesection however is generally practicable, provided the skin is not cold and moist, the pulse thready, or the countenance collapsed. If there is general heat, with a flushed face and a tolerably firm pulse, we may abstract blood from the arm not only with safety but with advantage. But our main reliance must be placed on leeches, applied in numbers proportioned to the age of the patient. We are of opinion that more good is derived from frequent relays than from a large

number applied at once; even though the quantity of blood abstracted is the same. Patients generally experience great relief to the pain of internal inflammation at the very time the leeches are drawing, which may be attributed partly to the counter-irritation, and partly to the circumstance that the blood is more forcibly attracted to the surface during their suction. We cannot otherwise account for the benefit produced by a very small number of leeches, in some diseases, the quantity of blood lost being far too inconsiderable to explain the effect. Inflammation of the mucous membrane may in many respects be managed on the same principle as inflammation of the skin; and as we use soothing applications in the one case, so may we in the other. We therefore are in the habit of ordering anodynes in all forms of mucous inflammation to which we can insure their direct application, as for instance to the stomach and the large intestine. In gastritis we may exhibit morphia, hydrocyanic acid, and hyoscyamus, with excellent effect, but it must be remembered that they are only auxiliaries. We sometimes prescribe them in combination with magnesia or soda. They are demanded however not only as a part of the antiphlogistic treatment, and therefore with a view to remove the disease itself, but also to soothe the pain and the vomiting. French practitioners are much attached to the use of acidulous mucilaginous drinks. If they are grateful to the patient, there is no objection to them, and they may perhaps be useful as emollient applications; but for the latter effect, they must be used in greater quantity than is for the most part desirable. In the earlier period of inflammatory disease, the stomach is contracted throughout as well as disposed to irregular spasmodic action, and therefore the copious ingestion of fluids leads to distention, and an increase of the pain and nausea. Few things are at once more agreeable and salutary than iced drinks. A piece of ice may be held in the mouth so as to dissolve gradually. When food can be allowed, cold arrow-root or sago-jelly, pleasantly flavoured, are unobjectionable articles.

The exhibition of remedies by the stomach is to be avoided as much as possible. Certainly we must not think of acting upon the bowels by purgatives so administered. This purpose must be accomplished by means of enemata, consisting of thin gruel, to which infusion of senna or castor oil may be added. Sometimes the carbonate of magnesia, as we have already observed, with the addition of a little hydrocyanic acid, may be tolerated by the stomach, and be sufficiently laxative; and in some cases instead of constipation we have the opposite state to contend with: but this is when the inflammation has extended to the lower part of the ileum and to the large intestine.

The exhibition of mercury, so important in all acute inflammations, is difficult in the present disease. If we determine upon its employment, it must be in the way of inunction or fumigation, but in the acute stage we have but little time for such processes. When leeching has been carried as far as seems desirable, we may use cataplasms, fomentations, or in some cases even cold applications. In the choice of hot or cold applications we may generally be guided by the patient's feelings.

These are the chief circumstances to be attended to in the treatment of acute gastritis. If the patient survives, he has often to go through the chronic form, the management of which we shall speak of presently.

2. *Subacute gastritis* must be treated on the same general principles as the acute. In some cases a general bleeding is a good preliminary to local depletion, but the latter is for the most part sufficient. It may be followed by sinapisms or blisters. The food should consist of bland farinaceous substances. We may venture upon mild laxatives by the mouth, such as manna, magnesia, castor oil, infusion of senna, and alterative doses of hydrargyrum cum cretâ.

3. In *chronic gastritis* local depletion is scarcely less important than in the preceding varieties, but it requires some difference in its employment. As we generally have to look forward to a tardy improvement, the cases being rare in which the disease can be removed by a *coup de main*, leeches are to be applied, in smaller numbers, and more frequently, though at more protracted intervals.

Their effect may often be greatly aided by a preliminary general bleeding ; but this will not be advisable if the disease has been of sufficiently long continuance to lower the strength and the nutrition of the body. If, on the other hand, the patient is still in tolerable vigour, and not deficient in his general circulation, the happiest results may be expected from venesection followed by local bleeding. We are persuaded that one of the most frequent mistakes in practice, is to apply leeches in too large a number, in cases of gastritis ; the consequence of which treatment is to exhaust the strength of the patient by the quantity of blood lost, before there has been time for reducing the morbid action in the stomach, by the revulsive agency of the remedy, as well as to prevent its repetition. We believe it is seldom necessary to apply more than six at a time, and sometimes three or four suffice. They may be applied daily for three or four days, or even a week, according to the strength and the degree of pain ; and afterwards twice or thrice in a week. During this time the diet must be of the most unirritating kind, consisting of farinaceous food and milk and well-boiled gruel : and the interval must be sufficient to give repose to the stomach. A lemon-water ice may be allowed after the principal meal. Improvement will be indicated not only by a diminution of spontaneous pain, vomiting, flatulence, &c., but also by the greater comfort after a meal, by the absence of feverishness, the improved sleep, and the alteration of the tongue. The change is often most striking and exhilarating to the patient, who had previously been trying in rapid succession, and with ever-recurring disappointment, the various nostrums commonly recommended in cases of indigestion. He must, however, be warned not to mistake this first stage for the whole of the cure, or to fancy that he may return at once to his usual habits. The local depletion should be followed by counter-irritation, and no form of this has answered better in our hand than a succession of small blisters to the epigastrium, about the size of a crown piece. When they produce much general irritation, we may substitute friction with croton oil ; occasionally we shall find the epigastrium very insensible to such agents. When this is the case, we may resort to tartar emetic, combined with lard as an ointment, or with Burgundy pitch as a plaster. The latter is a very effective though severe remedy. We have known relief ensue in the most obstinate cases during the eruption of the pustules.

The medicines employed in this disease are for the most part of a palliative description, such as anodynes and antacids. But of the first of these we may remark that their effect is not only beneficial by soothing the pain, but also by changing that condition of the nerves, which is so much connected with the excitement and maintenance of inflammatory action. Morphia and prussic acid are the most efficacious of this class.

In many cases anodyne applications to the epigastrium afford comfort in the form of fomentations, plasters, liniments. We often make use of a belladonna liniment, and of morphia sprinkled on a blistered surface.

A carefully conducted course of mercury may be resorted to in some cases, not only for the sake of keeping up the function of the liver, which often fails in this disease, but also for its specific effect in altering capillary action. Small doses of Pil. Hydr. or Hydr. c. Cretà combined with a sedative, may be administered every night till the gums are tender.

The regulation of the bowels in this disease is a matter of great nicety. The medicines most called for are generally such as the stomach is least capable of receiving. We might suppose that enemata would answer the purpose ; but unfortunately, though they succeed in unloading the lower part of the canal, they are incapable of promoting the secretions of the upper part, without which there can be no sufficient peristaltic action. It may therefore be almost imperative to give laxatives by the mouth. The most eligible are castor oil, Rochelle salts, manna, sulphur, infusion of senna, and lenitive electuary.

Aromatic medicines seem objectionable when the mucous membrane is inflamed, but our *à priori* expectations are often disappointed by the peculiar sen-

sibilities of the stomach ; and so far, in some cases, are substances, apparently pungent and acrid, from irritating the stomach, that they even soothe it. This remark brings us to speak of a class of remedies in chronic gastritis, entirely different from those to which we have hitherto adverted.

Every practical man has met with cases which seemed to require the deple-tory unstimulating treatment described above, but in which only the most tran-sient relief was derived from it, or in which it absolutely increased the distress. In cases of this kind (which will be found to be of long duration) such medicines as Arg. Nitr., Bism. Trisnitr., Ol. Terebinth., T. Benz. Co., Creosote, Ferr. Sulph., Quin. Sulph., and bitter infusions, have been used with advantage. Nor ought we to be surprised at their effect, when we know what a variety of stimulating agents are used beneficially, in the treatment of chronic inflamma-tion of the skin and the mucous membranes of the mouth, throat, conjunctiva, rectum, vagina, urethra, and bladder.

Of many of the above mentioned remedies it is probable that the operation is chiefly local ; that, applied directly to the diseased membrane, they change the action, which appears to be particularly the case with nitrate of silver. The management of them, however, requires great care and watchfulness, and they often need variation. In many cases the nerves of the membrane are far too irritable to bear any but the most soothing agents ; and in others their sensi-bility seems to have been obtunded by the disease. Sometimes after going the round of these substances, we return with advantage to the simple treatment ; just as we have seen an obstinate ulcer, or a psoriasis, which after the failure of a host of stimulating unguents has healed under the use of plain water dress-ings. We must offer a caution against imagining that because the stimulating treatment seems to produce relief in stomach cases of long standing, that there-fore they are merely examples of atonic dyspepsy.

The pathological conditions to which this treatment is adapted are of two kinds. In the first, the mucous membrane has undergone considerable textural alteration ; we have generally observed it in such cases hypertrophied, mam-mellated, and of a slate hue. The second kind is one in which there is less organic change, but the inflammation and congestion are passive. (See PATHOL. INTRODUCTION.) In many instances it is vain that we attempt to diagnosti-cate the precise condition of the capillary circulation, whether it be one of mere engorgement or of absolute stagnation of the blood, since they always co-exist, and readily pass into each other ; that is, congestion becomes inflammation, and inflammation leaves congestion behind it, and a spot of inflammation is always surrounded by a halo of congestion. Happily the same treatment is applicable to both, though in somewhat different degrees.

Warm bathing is beneficial in nearly all cases : a mild climate should if possible be obtained, and the patient must be admonished to take regular gentle exercise. The mineral waters of Harrowgate in this country, and of Ems and Marienbad on the continent should be tried in obstinate cases.

ORGANIC DISEASES OF THE STOMACH.

1. Carcinoma.—Anatomical characters.—Symptoms.—Causes.—Treatment. 2. Softening—Inflammatory—Chemical action of the gastric juice.—Gelatiniform softening. 3. Ulceration—Varieties.—Symptoms.—Treatment. 4. Perforation.—Morbid.—Cadaveric.

CARCINOMA OF THE STOMACH.

Anatomical characters. Having already treated at large of carcinoma (in the PATHOLOGICAL INTRODUCTION), we confine ourselves now to its appearance in the stomach. The most common form under which this disease presents itself is *scirrhus*, or the indurated, fibrous, semi-cartilaginous formation; and the part which it most frequently attacks is the pylorus. On making a section of the disease, the stomach is found thickened, of a gray or ashy colour, and streaked by lines, in which may be traced the muscular fibres hypertrophied, and in some cases apparently converted into carcinomatous matter; but the submucous cellular tissue is still more altered and indurated. The thickness is sometimes very considerable; we have found it more than an inch and a half, but it varies according to the diffusion of the deposit. When concentrated in one spot, the thickened part assumes the appearance of a lardaceous tumour growing in the walls; but the present form of the disease is characterized more by hardness than by bulk. The mucous membrane is either thickened and indurated, or partially ulcerated, with irregular elevations of the margin. The ulceration often perforates the stomach, and penetrates into adjacent viscera. When the whole organ is more or less affected, its volume is greatly diminished. though its parietes are thickened, and in this state it has reminded us of concentric hypertrophy of the heart.

In another form we find the cephalomatous characters prevail. The morbid deposit is collected into masses somewhat globular, growing from the submucous tissue, and throwing the mucous membrane forward, into the forms of polypi, fungi, vegetations, &c. Some of these consist of the true villous coat hypertrophied; others of medullary matter. In some parts of the organ we find a plentiful distribution of vessels, constituting the fungoid disease, or fungus hæmatodes. The density diminishes from the serous towards the mucous surface, the thickness often extending to several inches. This form prevails in the cardia.

A third form is that in which the parietes are considerably thickened, and in which a section of the morbid part presents no traces of the proper tissue of the stomach, but instead of it a great number of little cells, intersected by fibrous septa, and containing a glue-like matter; whence the disease has been called gum-cancer, or gelatiniform cancer, or from the cellular appearance, *cancer aréolaire*. M. Cruveilhier has given a particular description of it in his *Anat. Path.*, liv. x. Of all the forms it is that which is least frequently attended with indications of cancerous cachexia. The seat of this form of carcinoma is the pyloric extremity.

It is not often that we meet with the two first of these forms unmixed. More frequently they run into each other; the dense fibrous tissue being found in one part, as at the exterior of the tumour, and the soft medullary matter on the inner surface. Neighbouring organs are not unfrequently involved, particularly the liver and the omentum. We have remarked that the volume of the stomach is in some cases much lessened. When, however, the disease is confined to the pylorus, and produces obstruction of its aperture, the rest of the organ is often enormously dilated, with hypertrophy of the muscular coat.

The principal *symptoms* are the following: pain in the epigastrium, often of a burning character, more rarely lancinating, and occasionally of a gnawing description; eructations, acid or bitter; nausea; vomiting, at first of ingesta and mucus, afterwards of a ropy or shreddy white substance, and, at a still later period, of a bloody or sanious matter;* constipation, succeeded in the advanced stages by diarrhœa and extreme emaciation. To these symptoms may be added the following *signs:* a fulness in the epigastrium perceptible to sight and touch in the early periods, afterwards a hardness more or less circumscribed; and the peculiar hue and expression of the countenance belonging to the cancerous cachexia.

Although the above list comprises the usual phenomena of the disease, not one of them is pathognomonic, and any one of them may be absent. Our judgment must depend upon their concurrence. We shall offer one or two remarks upon the variations of the more prominent symptoms. The *pain* is sometimes increased by pressure or by aliment; more rarely unaffected; sometimes there is none. This is more frequently the case in the medullary sarcoma. Cruveilhier thinks that the gum-cancer is oftener latent than any other form. We discovered an enormous tumour in the cardia of a woman, chiefly encephaloidal, the vegetations of which projected into the cardiac orifice; but she had complained, during the latter days at least, neither of pain nor vomiting; nor could we learn that she had previously suffered from either of these symptoms: ascites, weakness, and emaciation were the only signs. *Vomiting*, then, is not a constant occurrence, but it may be present at one period of the disease, and afterwards disappear. This has been observed even in cases in which the symptom is most frequent, that is, in scirrhus of the pylorus. The obstruction is sometimes so mechanical, that vomiting continues throughout the disease, but there are two reasons why it may subside; 1, the obstruction may be removed by ulceration; 2, the muscular actions of vomiting respond best to irritations of the mucous membrane; and, consequently, when this is destroyed or disorganized, the usual medium of sympathy is cut off. The *matters ejected* are by no means unequivocal, since they are met with in the ulcerations of chronic gastritis. The *tumour* is one of the most certain indications when accompanying the gastric symptoms, but is often wanting; and we must not forget that it may be caused by the liver, the spleen, or the pancreas.

The disease most likely to be confounded with carcinoma of the stomach, is chronic gastritis with ulceration. The local and general symptoms may be precisely the same, but the presence of a tumour in the epigastrium will throw the evidence in favour of carcinoma. The age of the patient must be taken into account; for carcinoma ventriculi rarely happens before the age of forty. The pale lemon tint of the countenance, and the emaciation appearing very early in the disease, together with general languor and depression, are additional characteristics. But it has been confessed by the most acute and experienced observers, that the diagnosis is often one of the utmost difficulty, and Andral has declared, " hors le cas où une tumeur se fait sentir à travers les parois abdominales, il n'existe aucun signe certain pour distinguer ce qu'on appelle, dans le langage médical ordinaire, un cancer d'estomac, de ce qu'on appelle une gastrite chronique." (*Clin. Méd.*, 1re édit. t. iv. p. 432.)

The disease is conjectured to exist in the cardia when the pain and vomiting occur immediately after food, and especially if there is a feeling of impediment at the end of deglutition. The pylorus may be the inferred seat, when the pain and vomiting are later in their accession after food, and when a tumour is distinctly perceptible. In some cases the tumour has been observed to rise during

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* The coffee-ground appearance which occurs in this and other chronic diseases of the stomach, as well as the black vomit of yellow fever, consists of blood darkened and otherwise altered by the digestive fluid.　　　　　　　　　　　　　　　　G.

the process of digestion, in accordance with the change in the configuration of the stomach.

The progress of carcinoma, especially of the scirrhous species, is generally very slow. In some cases there are intervals of amendment in the local symptoms not easily accounted for, but by supposing that the congestion and inflammation which accompany this, as well as other kinds of heterologous disease, are susceptible of abatement, or temporary suppression. Moreover if the disease is sometimes latent during its whole course, we cannot wonder that its manifestations should be in any case suspended. On the exterior of the body, as in the mammæ, we observe it remaining inert a long time, even after ulceration has commenced; but this is much less likely to happen in the stomach, because of the slight amount of repose allowed to its function.

Causes. Carcinoma in the stomach, as elsewhere, presupposes a peculiar diathesis. (See PATH. INTRODUCTION.) Men are more liable to it than women; perhaps from their being more frequently exposed to the exciting causes, particularly irregularities of diet and the abuse of alcoholic drinks. Whatever produces congestion in the stomach may, in a person of the cancerous cachexy, determine the disease. Depressing emotions have been long recognised as causes; and, believing that these are more frequent and obstinate in men, M. Dalmas alleges that this is a sufficient reason why the latter should be more liable than females to scirrhus of the stomach. But these emotions lead to the formation of carcinoma in other organs, and such as are more frequently affected in women. It must be allowed, however, that no function is more disordered by mental states than that of the stomach. Certain occupations obliging the body to be bent forwards, as those of shoemakers, tailors, curriers, and others, have been considered productive of the disease; but they exert no influence more specifically injurious than that of deranging the stomach.

Treatment. Though there is no cure for carcinoma, we may do much towards alleviating the dreadful sufferings of the patient, and even retarding the progress of the malady. The selection of proper articles of diet is of the first importance; but there are few general rules which can be laid down on this subject, as the peculiarities of individuals are so widely different. There is no question, however, that the food which contains most nutriment, and is at the same time least stimulating, is the best. A milk diet is of all others the most suitable when it agrees; but some persons are unable to digest this fluid in any form. Some are most comfortable when living entirely upon farinaceous substances and animal broths; but in others, and not a small proportion, tender meat with boiled rice answers best. The cases are very few in which wine is beneficial or even agreeable, but when much acidity and flatulence prevail, a small quantity of brandy and water may be taken. Sometimes our wonder is excited at a *post mortem* examination, by observing the disorganization of a stomach into which substances, apparently the most inappropriate, had been taken with impunity and even with relish. This obtains both in chronic gastritis and in the disease under consideration. There is no end to the anomalies presented by gastric sensibility, but the probable explanation of the benefit produced by some kinds of stimulant substances has been already adverted to. In a very large majority, however, of cases of cancerous disease, we are persuaded that a system of quietude and non-interference is the best. Leeches, in small numbers, may be applied occasionally to the epigastrium, to moderate the congestion and inflammation which accompany the disease. As to medicinal treatment, we have very little to say beyond the recommendation of anodynes for relief of the pain and sickness. These substances have appeared to us more efficient in combination than when administered singly; and it is a good plan to vary them frequently, in order that the system may not become insensible to them by long continued use; for it has been often observed, that after employing a strong sedative for some time, a change even to a weaker one will produce more effect. Morphia and prussic acid act well

together; opium, hyoscyamus, and conium; belladonna, stramonium, and extract of poppy. As to morphia, it is a fact not easily explained, that in some persons sickness more frequently results from its use than from opium itself. Perhaps some of the other principles in the opium counteract this effect. Anodyne applications to the epigastrium are valuable auxiliaries; such are belladonna ointment, linen steeped in a watery solution of belladonna or in a hot lauda-num, cataplasms of opium or bread impregnated with laudanum, or made with the leaves of hemlock or belladonna, morphia sprinkled on a small blister, &c. Particular symptoms may require special treatment; such as acidity, bitterness, and flatulence. The action of the bowels must be secured by means similar to those recommended under chronic gastritis.

The diagnosis of cancer of the stomach is always doubtful, unless there should be positive proof of the presence of a tumour: if this be connected with difficulty of digestion, frequent vomiting of food, or still more of blood, the existence of cancerous disease may be assumed as nearly certain. There is rarely if ever much pain.   G.

SOFTENING OF THE STOMACH.

It has been already stated that softening of the villous coat, and of the sub-mucous tissue may result from inflammation. We only advert to it again for the purpose of warning the practitioner against mistaking for inflammatory what may be only chemical softening, of a kind to be described presently. Some of the most able modern pathologists have erred upon this point. M. Louis, for instance, attributed, at one time, some instances of pale softening and thinning of the mucous membrane at the cardiac extremity of the stomach, to a slow inflammatory action, but which have been satisfactorily shown to be cadaveric. That this is the more correct explanation is (much to his honour) admitted by M. Louis himself in one of his most recent publications. (*Examen de l'Examen de M. Broussais*, p. 16.)

That the gastric juice has the power of softening and dissolving the coats of the stomach after death, so as to produce perforation, was first shown by John Hunter. His observations were confirmed by Spallanzani, Adams, Burns, and Jæger; and still more recently by Dr. Carswell, whose experiments, conducted under a great variety of modifications, have placed the matter beyond all doubt. The fundus of the stomach is the part most frequently acted upon, because it is most depending. The following extract will convey an excellent idea of the lesion : " The form of chemical softening of the coats of the stomach by the gastric acid presents several important varieties. If the softening be confined to the mucous membrane of the fundus, the form which it assumes is that of small or large patches. These are generally irregular,—their bodies being formed by the mucous membrane, and the bottoms of each by the submucous coat; their edges, besides being irregular, are thin, soft, and somewhat transpa-rent. If the softening has extended to the other coats of the stomach, the edges of these are bevilled outwards, present a fringed appearance, or terminate in thin irregular prolongations which, when water is poured upon them, are seen to float like shreds of transparent coagulable lymph. Such are the forms of softening of the mucous membrane, so long as this membrane is smooth or stretched out by the contents of the stomach. But when this membrane is thrown into two folds, or forms plicæ, the softening occurs no longer in patches, but presents those remarkable appearances described by M. Louis, as indicating the existence of pathological alterations. The forms of the softening, in this case, are those of stripes and bands of various dimensions, occupying the situa-tion of the plicæ. Wherever these stripes or bands exist, we find that the mucous membrane has been completely dissolved, and the submucous coat laid bare. They have thus a bluish or silvery-gray aspect, while the mucous mem-

brane which they inclose may be of its natural colour, red, brown, or yellow, and appears in isolated patches of various forms and extent." (*Elem. Forms of Dis.* f. iv.)

If much blood existed in the organ at the time of death, the softened part is of a blackish or sooty colour. In most cases we have seen it of a dull white, traversed by sooty lines, evidently the remains of bloodvessels, the contents of which had been discoloured by the gastric acid. Both in man and animals the lesion is rarely observed in its greatest extent, (that is, with softening of the whole parietes and perforation,) unless the subject was in good health at the time of death, and had recently taken food. The slighter degrees of softening of the mucous membrane only, we have often noticed in cases of protracted disease, and we are of opinion, that it is often overlooked. Cruveilhier has described this cadaveric lesion as *Ramollissement pultacé*, to distinguish it from another which he considers morbid, and which he calls *Ramollissement gelatini-forme*. In both of them, the softening may go on to erosion and perforation. The gelatiniform softening is according to Cruveilhier an organic process, *sui generis*, a perversion of nutrition, without any trace of inflammation, suppuration, or gangrene; a kind of " retrogradation vers l'état gélatineux, muqueux." Andral points out the analogy between it and the softening of the cornea in animals insufficiently nourished.

The existence of this species, which is sometimes called *spontaneous gelatinization*, Dr. Carswell and others are not disposed to admit. There is, however, a class of facts which we shall find great difficulty in explaining, if we believe that the gelatinous softening is always a *post mortem* occurrence. We allude to certain cases of children prematurely weaned, in which, after an illness characterized by peculiar symptoms, no other morbid appearance was discovered capable of accounting for them; and also to other cases which have occurred in adults, whose death took place after a few hours' illness, and the only serious lesion was that under consideration. The symptoms in the infantile cases are thus described by Cruveilhier—" Une diarrhée verte, très-fréquente, semblable à de l'herbe hachée, si la maladie est intestinale; des vomissemens muqueux ou bilieux, si la maladie attaque l'estomac; une soif ardente, insatiable, tout-à-fait caracterisque; un amaigrissement trés-rapide (quelquefois en douze heures); une prostration de forces excessive; une face decomposée, et decolorée; un assoupissement léger, interrompu par des cris plaintifs, et des contorsions; une mauvaise humeur que rien n'égale; un pouls lent et irrégulier, le froid des extrémités; voila la réunion des signes le plus propres à différencier le ramollissement gélatiniforme de toutes les autres maladies de l'enfance." (*Anat. Path.* liv. x.)

These coincide remarkably with the phenomena observed by Dr. John Gairdner, who published (*Ed. Med. Ch. Trans.*, vol. i.) a very valuable collection of cases of the same disease. Of the adult cases the following is a specimen :—" A young lady, previously in good health, was awakened at three one morning, with excruciating pain in the stomach, which nothing could alleviate. She expired seven hours after; and, on dissection, two holes were found in the back part of the stomach, surrounded with much softening of the villous coat." (*Christison*, p. 119.) The symptoms in this, as in other cases, were referred to the stomach; the person died after a short illness, and the only pathological alteration was this appearance in the stomach. Supposing we consider the softening and erosion to have been merely chemical, how are we to account for the symptoms and the fatal termination? Disease must have existed, and disease of the stomach; but this organ presents no sign of inflammation, injury or poisonous action; nothing but the peculiar softening has been found on the anterior part of the stomach, upon which it is difficult to imagine that the gastric juice could have acted. This happened in the case represented in Cruveilhier's plate; and in the celebrated case of Miss Burns, who was erroneously supposed to have died of poisoning. (See *Christison on Poisons*, p. 33.) Dr.

Christison mentions that the late Dr. W. Cullen showed him a stomach in which the softening had commenced upon the *peritoneal* coat, and exposed the muscular fibres.   Were it not for this fact, and the locality of the lesion in the fore part of the stomach, we might conclude with Dr. Gairdner, that even in morbid cases the gastric juice was the solvent agent, and that disease had rendered the tissue more soluble.   This opinion has also been arrived at by Andral. (*Anat. Path.*, t. ii. p. 88.)

The subject requires still further investigation.   But thus much appears certain, that whether the change in question is in all cases cadaveric, or in some of a morbid nature, it is not easily confounded with the action of any irritant poison, excepting oxalic acid.   And even in the latter case, there are usually signs of vital reaction around the margin of the corroded part.

ULCERATION OF THE STOMACH.

Ulcers of the stomach, not produced by carcinoma, may be arranged under the following heads :—1. Slight erosions of the mucous membrane, distributed over a surface exhibiting the effects of chronic gastritis ; 2. Minute ulcers with red margins, often scattered over a pale surface ; these result from inflammation of isolated follicles ; 3. Ulcers penetrating the muscular, and even the peritoneal coat, the base being formed by an adjoining organ.   These are circular or oval, and are bounded by hard margins, either elevated, or so much on a level with the surrounding membrane, as to appear to have been stamped out with a punch.   They generally exist alone, and are situated either in the small curvature, or near the pylorus on the posterior surface.   In the latter situation they have assumed an annular form.   The edges are of a dead-white, or gray hue, and their density is owing to hypertrophied cellular tissue.   They are distinguished from cancerous ulcers by the absence of malignant deposit at the bottom of the ulcers. (See Cruveilhier, *Anat. Path.* l. x.)   4. Ulcers of an irregular shape, with ragged margins, produced by gangrene.   These are rarely, if ever, seen, except as the result of irritant poisoning.

It has been already stated that ulceration of the stomach, as a spontaneous disease, is a chronic action.   The two first of the above species are the most common ; and their symptoms and pathology are those of chronic gastritis.   The third species are remarkable for being in some cases quite latent, until perforation of the organ has suddenly taken place.   This lesion has frequently occurred in chlorotic females.   The general condition of these subjects is obviously very favourable to the ulcerative process.   In other instances, however, they are attended by the most distressing symptoms, closely imitating those of cancer ; and we are not acquainted with any certain means of distinguishing them from the latter.   We remember a case which exhibited every characteristic of cancer, both in the local symptoms, and in the general emaciation and cachexia ; but which, after death, presented only a large clean-edged ulcer, in the pyloric extremity, close upon the orifice, with enormous dilatation of the stomach.   The latter effect, as well as the great sufferings of the patient, were doubtless caused by the irregular action of the fibres about the pylorus, some of them having been destroyed by the ulceration.   But although in some cases the diagnosis may be very obscure, in others we shall be assisted by the absence of the general signs of carcinoma on the one hand, or on the other by the presence of a circumscribed hardness in the epigastrium.   The tumour, however, may be caused, as we have before remarked, by enlargement of the left lobe of the liver : nor will it suffice to say that such a disease would be wanting in the purely gastric symptoms, such as mucous, or coffee-ground vomiting, pain after food, &c., for the stomach, as we have known, may be unnaturally adherent to the liver, and therefore so embarrassed in its movements as to produce every kind of gastric distress.   If hæmatemesis should occur in a person who has for

some time suffered from chronic gastritis, or if the patient's stools should present a dark pitchy appearance, indicating the presence of decomposed blood, we may strongly suspect ulceration of the stomach. It is very desirable to arrive at a correct diagnosis, not so much for the treatment as for the prognosis, which, in the simple ulcer, would be far less discouraging than in carcinoma; the former being capable of cicatrization. The celebrated Beclard cured himself of this disease. The treatment is chiefly dietetical and palliative; consisting in a careful selection of such aliments as are found by the individual to be most easy of digestion, and in the administration of sedatives.

If ulcerations of the stomach are not extremely large they give rise to very obscure symptoms, especially in children. Ulcerations are more frequent with them than with adults, and I have seen numerous rounded and follicular ulcerations, while the appetite of the child was perfectly preserved. It is the extent rather than the depth of the disease which is a matter of much moment.   G.

PERFORATION OF THE STOMACH.

Morbid perforation has often been called *spontaneous;* a term which might lead to the supposition that the lesion was a peculiar action, independent of other disease. The term, however, was first used to distinguish morbid perforation from that occasioned by corrosive poisons; for it was at one time supposed that the disorganization was always the effect of such agents.

Perforation, from disease, has the following causes:—1. Simple ulceration, beginning either in the mucous coat, and gradually advancing to the serous; or much more rarely beginning in the peritoneum; sometimes, when the ulcer has reached the serous membrane, the continuity is suddenly destroyed by laceration; 2. Carcinomatous ulceration; 3. Gelatiniform softening.

Cadaveric perforation is produced, as we have seen, by the gastric juice. The spleen, liver, diaphragm, and œsophagus, often share the action of the solvent liquid which has escaped from the stomach, or transuded through its tissue.

Although the stomach may be perforated by ulceration, it does not follow that its contents must escape, for the opening may be closed by adhesions of the neighbouring viscera, caused by extension of inflammation from the outer surface. But when the accident does occur the symptoms are those of sudden and violent peritonitis. (See PERITONITIS from PERFORATION.)

DYSPEPSIA.

Preliminary observations.—Acute dyspepsia.—Two forms.—Symptoms of the first.—Causes and treatment.—Symptoms of the second.—Causes and treatment.—Chronic dyspepsia.—Symptoms.—Local.—General.—Causes.—Nature.—General treatment.—Diet.—Regimen—Treatment of particular symptoms.—Influence of gastric disorders upon other organs.

THE term Dyspepsia (derived from δυσπεπτεω, to digest with difficulty) implies impeded or painful digestion, or as Dr. Todd has expressed it, any derangement of that function by which the aliment is converted into chyle.

It can scarcely be disputed that the liability of an organ to derangement is in direct ratio with the complexity of its function. In the latter respect the stomach is surpassed by no other organ; for it has not merely to receive and retain its contents for a certain time, and then expel them by a simple propulsive action, like that of many other hollow viscera, but it must also keep them by its churn-

ing motion in a continual agitation, so that they may be effectually subjected to a peculiar chemical process, the principal agent in which is a fluid secreted from its inner surface. These several actions afford so many occasions of derangement.

One source of disorder which the stomach shares with many other organs, is the large supply of blood required by its secreting function, and rendering it liable to suffer from the opposite states of plethora and anæmia. But it contains in itself another cause of disturbance, still more extensive and frequent in its operation, viz., its intimate sympathy with other organs, for which it is probably indebted to its liberal endowment with nerves, both from the cerebro-spinal centre and from the ganglia. So often is the stomach implicated in morbid affections of other parts, that some have supposed it to be the *primum mobile* of every disease to which the system is liable. There can be little question that disease of this organ is a fruitful parent of other maladies, both on account of its peculiar function and its wide-spread sympathies; but we believe that it receives scarcely less injury than it distributes, and that the very disorder which it may have originated in other parts often recoils upon it with redoubled violence. The increasing prevalence of gastric affections in the present age, when to say the least, our mode of diet is not more irritating to the digestive organ than was that of our fathers, leads us to seek their origin in parts of the system on which modern habits exert a more direct influence; a search soon terminating in the nervous system, which, in the respective classes of the community, the unnatural hours, the enfeebling luxuries, the toil and excitement of the intellect, the commercial anxieties, the struggles of men, *sollicitè ambientes, callidè litigantes,* or of others who in a redundant population subsist only by the most ardent and emulous exercise of their inventive faculties, are constantly perturbing and paralysing. Upon a hasty view it might be thought needless to look beyond the excesses or errors of diet to which all men are more or less prone, for sufficient causes of the frequency of gastric ailments. But the stomach is so admirably organized, so capable of accommodating itself to all the apparently pernicious usage which in the selection of food it receives from the necessities, the vices, or the caprices of mankind, that were there no other source of disturbance the organ would perform its function with little impairment.

If the sensibility of an organ be an index of its liability to disorder from outward agents, which seems to be the case in the eye and in serous membranes, certainly this test is wanting in the stomach, which bears the presence of substances such as no other organ undefended by epidermis could tolerate. Here the ingesta are, as it were, suddenly deprived of their active properties; for the scalding liquid, the pungent spice, the acrid medicine, the frozen sweetmeat, nay, the mechanical irritant, are often forgotten when the impressions which they left upon the tongue, the fauces, and the gullet, have been effaced. The necessity for such an organization that neither pain, nor the derangement of which it is the criterion, should be easily excited, is obvious from a moment's consideration of the difference between its circumstances, and those of every other hollow viscus. The heart, the bladder, the intestines, all receive substances, more or less chemically prepared for them, and differing but little in their composition at different times; but into the stomach are carried the most heterogeneous agents, which have received only a mechanical adaptation to the organ which they visit. The means by which the latter so often escapes injury of its structure, are probably the copious secretion of mucus, and the capability possessed by the mucous membranes of accommodating themselves to varying quantities of blood. To these we may perhaps add the diluting or neutralizing action of the various aliments on each other.

But although the stomach in its healthy state is thus capable of resisting the seemingly deleterious influence of many substances used in diet, we must bear in mind, that when it has once declined from its natural tone, even the simplest of them may immediately become powerful irritants; just as the most pleasing

colours, sounds or odours, may offend their respective organs when morbidly affected. Hence it is obvious that gastric disease, in the first instance slight or transient, incurs the risk of being kept up, recalled, or exasperated, whenever the subject of it is compelled to take nourishment.

Acute Dyspepsia.

Before describing the chronic, and more important form of this disease, we shall briefly notice two affections, slight in their character, and of short duration :—

I. The first may be called *acute* dyspepsia, or indigestion, corresponding to the *embarras gastrique* of French authors. The *symptoms* are anorexia, a feeling of weight and fulness at the epigastrium, nausea, and eructations, which often bring up bitter or acid fluids, or gaseous matters, tasting like sulphuretted hydrogen, and with these local disorders there are often conjoined pain in the loins, aching of the limbs, dull headache along the supra-orbital ridge, confusion, or incapacity of thought, and despondency. The tongue is white, sometimes loaded with a dry fur, but more frequently with a coat of thickish paste. The skin is cool, the pulse small and soft, the face pale, and the eyes look dull and heavy. The patient may continue in this state for several hours, till vomiting occurs either spontaneously or by the help of medicine. The substances ejected consist of undigested food and mucus. The evacuation of the stomach is generally followed by a feeling of great relief, and the sympathetic disorders soon subside. It often happens, however, that the stomach is left in a state of considerable debility, preventing the patient from resuming at once his usual mode of living.

The most frequent *cause* of an attack of this nature is excess in eating when the stomach is debilitated, or the use of indigestible aliments. But in many cases the food is not particularly in fault either as to quantity or quality, but something has previously occurred to impair the power of the stomach; such, for instance, as great bodily fatigue, mental exhaustion, intemperance, broken rest, depressing emotions. The reception of unwelcome intelligence during a meal is quite adequate to the production of such an attack as we have described.

The first step in the *treatment*, is to administer an emetic, consisting of ipecacuanha wine, or salt and water. When the stomach has been thoroughly cleared, and the nausea has passed off, a dose of aperient medicine should be given. Rhubarb and sulphate of magnesia, with aromatic confection, will form a good combination; or if the first of these articles is repugnant, we may exhibit the salts dissolved in infusion of roses, to which the compound tincture of cardamoms may be added. If this also is rejected, the best resource will be pills of the compound extract of colocynth, with a small quantity of calomel or blue pill. Effervescing draughts, made with carbonate of potash and lemon juice, or soda water, will be found useful in restoring the tone of the stomach. The patient must abstain from solid food till the following day. The best articles are arrow root, well-boiled gruel, and other farinaceous substances.

Sometimes after an attack of this nature the stomach falls into a state of chronic weakness, the symptoms and treatment of which will be discussed presently.

II. Another form of acute functional disorder, to which the stomach is liable, is what passes under the popular term of *bilious seizure*. Many of the symptoms in this affection are the same as in the former; but the spontaneous sickness is more violent and not attended with the same amount of relief; there is also more general disturbance; thus there may be rigors succeeded by smart fever, and most distressing headache. The mouth is parched, and the tongue covered with a yellowish fur. The matters vomited taste very bitter, and are of a yellowish or green colour, according as the bile has been acted upon or not

by the acid in the stomach. The patient is seldom relieved till the bowels have been freely evacuated, though we have known the symptoms subside almost suddenly, some hours before the occurrence of a stool.

The attack is generally preceded by indisposition, languor, dulness, chilliness, loss of appetite, and giddiness. Some persons can foretell its approach by derangement of sight, consisting of general indistinctness, or a sensation of darkness ; sometimes only the half of an object is visible. With these visual disturbances there may be noises in the ears, and anomalous affections of tactual sensibility, such as tingling or pricking in the hands, or along one or two of the fingers, pain in the right shoulder, &c. The face and conjunctivæ are generally suffused with a yellow or muddy tint.

The cause of this disorder is regurgitation of bile from the duodenum into the stomach, and probably the previous derangements are owing to an excessive secretion of this fluid, and to the accumulation of it in the duodenum from some obstruction in the bowels. Some persons are constitutionally liable to such disorders, and are said to possess the bilious temperament. The attack may be brought on by inattention to the bowels, disturbance of the emotions, excess in eating and drinking, and by certain states or variations of the atmosphere. Of the latter, the most unfavourable conditions perhaps are humidity, preventing due evaporation from the surface of the body, or an east wind diminishing the vital action of the skin.

Treatment. The vomiting may at first be assisted by diluents, but it must not be encouraged indefinitely merely because a feeling of nausea continues. Nor is the repeated ejection of bile any proof that vomiting is still required, since this action will alone be sufficient to force the bile into the stomach. The first opportunity of quiet must be seized for administering a small pill containing calomel or blue pill. Two or three hours afterwards an aperient, in the form of a draught or pills, may be administered ; if the stomach rejects these medicines, we must endeavour to excite the action of the bowels by clysters. The sickness may often be allayed by effervescing fluids, which are rendered more efficient by the addition of a small quantity of brandy, or of a few drops of laudanum. A sinapism to the epigastrium, followed by the application of flannel sprinkled with warm laudanum, is of great service in these cases. An alkaline draught, consisting of half a drachm of carbonate of soda, or of condensed magnesia in plain water, is sometimes the best remedy.

The headache and fever generally subside when free evacuation of the bowels has been effected ; but the former may be mitigated by cold applications, and the latter by effervescing salines. After the attack has gone by, it may be proper to adopt a course of mild alteratives, conjoined with a light vegetable tonic. The Cheltenham waters are eminently useful to persons who suffer from bilious derangement.

Chronic Dyspepsia.

The *symptoms* of chronic dyspepsia are *local* and *general*. The former may be arranged under, 1, disordered sensations ; 2, disordered movements ; 3, disordered secretions.

1. Impaired appetite, or absolute deficiency of it, called *anorexia ;* disgust for food, and nausea ; excessive appetite, or *bulimia ;* perverted, or *pica ;* uneasiness at the epigastrium, sometimes amounting to pain, most commonly after food, but occasionally in the intervals of eating. Sensations called *gnawing, raking,* sometimes with feelings of sinking and emptiness, or with fulness and weight. 2. Vomiting, chiefly of food imperfectly chymified, with mucous or bilious matter ; cramp, eructation, rumination, hiccup. 3. Flatulence, ejection of acid, acrid or bitter fluids ; sometimes the fluid is thin, glairy and insipid, and thence called water-brash.

The *general* symptoms are almost co-extensive with the whole economy; we shall not attempt to set down more than the most common and prominent. The class of feelings attributed by some physiologists to a *sixth* sense, having reference to the general condition of the body as to health, strength, elasticity, &c., are in dyspeptic subjects very remarkably affected; producing discomfort or *malaise,* a sense of indisposition, lassitude, or an aching weariness; which patients often emphatically designate as wretchedness. It is generally but not always coupled with dejection, or anxiety, and very often with irritability of temper, and incapability of taking pleasure or interest in any thing, whether in the physical or in the moral world. The intellect is oppressed, and the senses are dull or deranged; to the latter affections belong wandering pains, itching, pricking, noises in the head, *muscæ volitantes.* The muscles are weak, and sometimes spasmodically contracted. Headache, particularly over the eyes, is often complained of. The sympathies in the respiratory system are not very striking, at least in the earlier periods of the malady. When they do occur, it is in the form of oppressed breathing, hard cough, and morning expectoration. The action of the heart is not unfrequently irregular, or intermittent, or palpitating; sometimes there is a *sense* of palpitation though none can be detected externally. The bowels are generally sluggish, either because a torpor similar to that of the stomach extends through the fibres of the whole canal, or because the secretions, both hepatic and intestinal, are deficient; but sometimes the alvine evacuations are regular and natural. The aspect of the urine is variable, one day dark-coloured, depositing uric acid, another preternaturally pale; often turbid, and covered with a many-coloured film. The tongue is for the most part coated with a white fur, often pallid, and sodden, the breath fœtid, and the skin perspiring. There is a want of equable warmth, the patient complaining of general chilliness, or of cold feet; but sometimes at night there is feverishness, with dreamy, unrefreshing sleep. The countenance for the most part betrays the frame of mind; and the eyes are often suffused with a dull redness, or have a lack-lustre appearance.

The symptoms thus cursorily described are grouped in every conceivable variety. With one the local predominate, with another the general. Often the patient's own account is fixed on some one symptom, such as the uneasiness after food, or the flatulence, or the general weakness. The disease may come on gradually, or appear at first in transient attacks, attributable to irregularities of diet, and afterwards become permanently established.

Causes. Early life is very little subject to dyspepsia, as an idiopathic complaint; but it may appear at any time after puberty, though it is most common in middle age. Women are considered by some to be more subject to the disorder than men, and our own experience rather accords with this view, though it is difficult to speak with precision as to the relative frequency of a disease so commonly met with in both sexes. Persons of a nervous phlegmatic temperament, or of a habit debilitated by long illness, loss of blood, profluvia, insufficient nourishment, unhealthy atmosphere, broken rest, are predisposed to dyspepsia. The enervating effect of luxury and indolence may become manifest in this way; and the apparently opposite agency of mental labour and bodily fatigue. Long perseverance in the use of articles indigestible more or less to all, or which have been found to disagree particularly with the individual: irregularities in the times of taking food, and in the quantities taken; sudden changes of aliment, the frequent employment of narcotic medicine, the abuse of tea and coffee, the use of tobacco, whether by mastication, smoking, or in the form of snuff, exclusive addiction to vegetables, may so weaken the powers of the stomach that the slightest disturbance of the health develops the disease. The temporary aggravations may often be traced to substances particularly unwholesome, as crude fruits, rich dishes, pastry, &c. Upon no subject is it more important to put pointed questions to our patients. They talk in general terms of living regularly and moderately, and upon plain and whole-

some food; yet when asked to specify the substances partaken of, the hours of eating, the amount of the meals, the degree of bodily exercise, &c., they confess a number of circumstances fully adequate to account for their symptoms. When the examination, however, does not develope facts of this kind, and there is no evidence of any cause of debility in the system, we may suspect the operation of some mental or moral cause, such as an overstrained intellect, grief, disappointment, anxiety, &c. Dyspepsia is a common accompaniment of nervous diseases, particularly hysteria and hypochondriasis.

Nature. The pathology of this disorder is not absolutely demonstrated; but we may reasonably infer that the fault is due, either to an insufficiency or to an impairment of the gastric juice, with or without an atonic condition of the muscular fibres of the stomach. Gentle agitation of the food, its easy solution, and gradual propulsion towards the pylorus, are the chief requisites for healthy digestion; and irregular contraction or weakness of the muscular coat, may, together or singly, so disturb the process as to give rise to the symptoms of dyspepsia. One of the most likely circumstances to produce deficiency of the gastric juice is an anæmial condition of the mucous membrane, which may be either a part of a general exsanguine state, or chiefly local, in consequence of excessive determination to some other organ, as, for example, the brain. But a state of congestion, most probably of the passive kind, may be in some cases suspected. The physiology of the nerves of the stomach is not in a settled state, but there is every reason for believing that disordered innervation of this organ plays a very important part in the pathology of dyspepsia. But how much is due to alteration of the capillary circulation, and consequently of the secretion under the agency alluded to, and how much to mere derangement of the *motions* of the stomach, is yet to be determined.

Treatment. The chief indications are to impart tone to the stomach; and to remove the more urgent symptoms. The first object must be attempted, not only by remedies directed to the organ itself, as well as to the other parts of the digestive apparatus, but also by measures capable of acting on the stomach through the general system.

1. As a general rule, the treatment may be commenced by administering medicines calculated to remove any cause of irritation in the stomach and bowels, and to promote the healthy secretion of bile. Certainly, unless the constipation which so commonly attends the disease be removed, and its recurrence guarded against, it will be quite vain to attempt the use of any medicines corrective of the stomach itself. Whether an emetic should precede the aperients must depend on the particular case; if the tongue is much loaded, and the patient complains of oppression at the epigastrium, and there are no contra-indications in the habit, such as pregnancy, a tendency to hæmorrhage, hernia and the like, the subsequent treatment may be considerably facilitated by an emetic dose of ipecacuanha. If the attack is recent, and especially if referrible to excess, or any other error of diet, the indication is still more obvious. In the choice of aperient medicines, we must bear in mind that they are not to be administered with any revulsive object in view. Those are the best which effectively unload the great intestine, and gently solicit the secretions in the upper part of the canal without producing irritation. The latter effect may be suspected when there is much mucus in the stools. We generally prescribe a small quantity of blue pill with compound galbanum pill, or with a little extract of henbane, aromatic powder, and a grain or half a grain of ipecacuanha to be taken at bedtime, for a few nights in succession, and to be followed in the morning by an aperient draught.

Subsequently, if regular evacuations cannot be secured by the kind of diet adopted (an object of the greatest importance), the patient may take every night the compound rheubarb pill, or a combination of this with the compound colocynth pill, and it will be much better for him to take daily the smallest quantity capable of producing the desired effect, than to have recourse to more active means at longer intervals.

After this preliminary treatment, and after having directed a plan of diet, we may apply the more directly local measures, consisting of medicines calculated to remove the asthenic condition of the stomach. These belong chiefly to the class of tonics. Their precise mode of operation in this disease, is by no means ascertained; and the notion, once so prevalent, that they give firmness to the muscular fibre, is much too limited to explain their influence. It might be supposed that they act much in the same way, as when they impart strength to the whole system, that is, through the nervous system, or even that the effect on the stomach is only a part of the general operation. But many of this class of substances are too local in their action to allow of such an interpretation; and on the other hand it has been thought, with much justness, that the tonic influence of many of them on the whole system, has been secondary to the improvement of the stomach. The change produced in the gastric membrane, and its secretion, by their direct application has been too much overlooked, though attention is called to it by an abundance of analogies in the operation of medicines which improve the other parts of the canal. At the same time an action upon the nerves and muscular fibres may be presumed, though how much importance is to be assigned respectively to these several modes of action can scarcely be even conjectured.

It is well to commence with some of the lightest vegetable bitters, such as cascarilla and calumba, which may give way in time to gentian, quassia, and chirayita. The form most generally suitable is that of infusion. Rhubarb infusion is an excellent medicine to begin with, having stomachic properties not to be explained by the slight bitter which it contains. We have no doubt that it acts chiefly on the gastric secretion. The good effect of these remedies is much assisted by combining with them carbonate of soda, magnesia, or ammonia, and a warm tincture. But the use of these and many other additions will be more apparent when we come to speak of the means employed against particular symptoms. Lime-water, creosote, trisnitrate of bismuth, and nitrate of silver, are some of the most valuable of our resources in this disease, because they have the twofold advantage of relieving urgent symptoms, and acting permanently upon the gastric surface. The same obtains to a certain extent with the mineral acids, which may be exhibited in combination with the bitter infusions, or with some of the aromatic waters. In some persons it is found that the vegetable tonics suit the stomach better when assisted by carbonic acid.

They may be known to disagree not only by complaints of nausea, uneasiness, headache, feverishness, but also by the state of the tongue. The presence of a fur on the tongue is generally a sufficient contra-indication to their use, but not in all cases; for with some this state is habitual, and with others, especially persons of relaxed habits, it disappears during the exhibition of tonics. When the bitters cannot be continued, the mineral acids are often excellent substitutes. In many cases the only complaint against the vegetable tonics is of a negative kind, namely, that they produce no sensible effect. We may then try the more potent tonics, such as preparations of iron, and quinine, either singly or in combination; the extract of hop is a good addition when the sensibility of the stomach is morbid, or the Extr. Papav. Alb. The iron may be advantageously administered as a soluble salt in combination with infusion of calumba. In many cases we have seen great benefit result from a combination of Aqua Calcis and Dec. Cinchon. Strychnia has also in our experience proved a valuable remedy, especially in nervous subjects. But for many patients all these remedies sink into insignificance when compared with the mineral springs,—the carbonated waters of Spa and Seltzer, the thermal springs of Bath, and Carlsbad, and the chalybeates of Cheltenham, Tunbridge Wells, Pyrmont, &c.

The *diet* proper for dyspeptic invalids is one of the first things to claim our attention, and is often the subject which the patient for obvious reasons most presses upon us; but he is more apt to seek information respecting the kind of

food, than as to the quantity and the intervals at which it should be taken. Five hours may be considered a good average allowance to the stomach for the performance of its duty and the subsequent repose. A much longer period is exhausting to the general system; a shorter is teasing and fatiguing to the stomach. The following brief sketch of a diet suitable to many dyspeptics, will give a general idea of the proper quantities and qualities of aliments, but may need many modifications and adaptations in particular cases:—

Breakfast may consist of light cocoa with bread somewhat stale, and a small mutton chop, or an egg lightly boiled, unless there be any reason in the general habit to contra-indicate much animal food. The cocoa should not be prepared with milk, and if even in its lightest form it does not appear to agree, coffee or weak black tea may be substituted. The quantity of fluid should not exceed one breakfast cup, unless we can persuade the patient to begin the meal by taking with the meat and bread half a tumbler of cold water. In some cases we have seen the best effects result from confining the breakfast to the latter articles, and taking no warm fluid at all.

The *dinner*, which should take place at one or two P. M., supposing the breakfast hour to have been eight or nine, must be almost as simple as the latter meal. If the patient attempts much more than meat, bread, and well boiled rice, he will be pretty sure to provide trouble for his stomach. The best meats are venison, mutton, tender beef, and game : fish, and the white meats, including poultry, are very doubtful articles. It is true that some of them are often prescribed in convalescence from acute disorders, and thence we imagine has originated the common notion of their fitness for invalids in general. In the cases alluded to, the reason for ordering them is, that they are less stimulating and heating than the browner meats, though less digestible ; but this is no recommendation to them in dyspepsia. We believe that in a large majority of cases the use of vegetables ought to be forbidden, though the patient will often plead hard for them, and especially for potatoes, which he fancies to be peculiarly harmless. But this root, valuable as it is for the amount of nutriment which it contains, requires a powerful digestion to extract its virtue. Pastry, sweetmeats, preserved fruits, are all inadmissible. Patients, when condemned to restrictions of this nature, are fond of quoting cases among their friends in which every variety of food is taken, and in which the forbidden articles may even constitute the staple nourishment; but the best answer to such remarks is, that, as " to the pure all things are pure," so, in one sense, to the whole all things are wholesome. A moderate quantity of fluid is not objectionable, as it assists the diffusion of the aliment over the gastric surface ; the most suitable is wine and water, in equal proportions, about two ounces of each. The best wines are old Sherry, Madeira, Hock, or Moselle. In some cases wine of all kinds produces acidity. We have then a good resource in diluted brandy.

Dessert cannot be enumerated among the proper refections of the dyspeptic. Even if some kinds of ripe fruit are allowed, it must not be at this period, when the stomach should be as little embarrassed as possible.

Three or four hours after dinner, a cup of coffee may be taken, or if the patient have no aversion to it, a cup of cocoa, with dry toast, or biscuit. The supper may consist of oatmeal porridge, arrow-root, sago, or a biscuit with wine and water : the first of these articles is of great service in assisting the action of the bowels.

On reviewing the above sketch it may strike the reader that the aliment is too digestible ; he may think that the digestive apparatus as a whole is adapted to a great variety of food, a certain proportion of which must become excrementitious, and which the lower part of the canal is especially designed to receive, and consequently that in taking food of too soluble a description we deprive the large intestine of the stimulus which it was intended to receive, and thus produce constipation. This reasoning is applicable to a person in health ; but from a weakened stomach, so much food is apt to pass imperfectly chymi-

fied, that should the ordinary kinds and quantities be taken, there is fear of bur-
thening the intestines with a larger amount of excrementitious matter than they
are fitted to dispose of, and therefore of inducing a constipation of a far more
objectionable kind than the other.

The general regimen of the dyspeptic may be comprehended in the following
directions. He should every morning either sponge the whole body with salt-
water, and use diligent friction afterwards, or take a shower-bath, at such a
temperature as insures a gentle but not violent reaction. He should use regular
exercise, and if possible by walking. It may be varied by horse-exercise, and
in some cases the latter is the only kind that can be kept up to a sufficient extent.
When the weather prevents out-door exercise, some substitute for it must be
found at home. Regular and early hours for rising, and retiring to rest, must
be observed; occupation of an interesting kind must be sought, sufficient to
divert the mind from the bodily ailments, without occasioning great anxiety.
Intellectual exertion must be avoided after meals, lest the determination of
blood, required in the stomach for a due secretion, should be withdrawn by the
brain.

2. The second indication is to remove or mitigate particular symptoms, such
as pain, pyrosis, flatulence, heartburn, palpitation. Of all of these it may be
remarked that they often yield to the treatment directed under the first indica-
tion; but in many cases of long standing, in which the asthenic condition of the
stomach is irreparable, we are obliged to seek means for the relief of the more
prevailing though partial evil. The remedies, proper for the pain and the pyrosis,
will be considered under the articles GASTRALGIA and GASTRORRHŒA.

Flatulence. In its milder degrees little more may be necessary than one of
the carminative waters, with the addition of carbonate of soda or ammonia.
When the symptom is obstinate our remedies must be more active. A com-
bination of magnesia, rhubarb, and cinnamon, or mint-water, with Sp. Ammon.
Fœt. often answers our purpose. The compound Galbanum pill, with a grain
of capsicum, the Inf. Armorac. Comp. and the Sp. Æth. Comp. are good medi-
cines. In some cases we have found creosote, and in others the Ol. Terebinth,
succeed where a great variety of medicines had failed. Flatulence is sometimes
accompanied by a spasm of the respiratory muscles, producing a symptom of
angina pectoris, especially in gouty subjects. We have often employed in such
cases a combination of magnesia and carminatives, to which valerian, castor,
and Hoffmann's anodyne liquor may be added with good effect.

Heartburn. This is often accompanied by a sense of acidity in the mouth
or throat; in other cases the matter eructated produces an acrid sensation in
the throat, but not any soreness. Alkalies and alkaline earths are the remedies
commonly employed either singly or together. The relief which they effect
is seldom more than temporary; neutralizing the acid matter in the stomach,
but not preventing its reproduction. We may except, however, the Liq. Potass.,
and the Aq. Calcis, which appear to have a more permanent action. In obsti-
nate cases experience has taught us to rely much more upon the seemingly
homœopathic help of the mineral acids, which, by giving tone to the gastric
membrane, subvert the cause of the evil instead of merely parrying its effects.

Nausea and vomiting. Effervescing draughts, with or without the addition
of laudanum, may be first tried, or the diluted hydrocyanic acid in doses of
from three to five minims. Carbonate of magnesia in plain water has suc-
ceeded, in our experience, when a great variety of other means had been un-
availing. Sinapisms and blisters to the epigastrium, or linen dipped in hot
laudanum, may be used with advantage; very often have we found that the
best remedy of all was brandy taken undiluted, in tea-spoonful doses at short
intervals, and scarcely less often have we found that nothing was of any
avail, but entire abstinence from ingesta of any kind, whether food, drink, or
medicine, for several hours. Creosote is frequently an effectual remedy in
checking sickness and vomiting.

Palpitation. This frequent attendant upon stomach complaints may often be referred to some particular article of food, and its relief must be waited for till digestion has been accomplished, or the substance has passed out of the stomach. In many instances it depends on accumulations in the colon, and a full injection containing turpentine or assafœtida is the best remedy. In some dyspeptics, acidity in the stomach is always accompanied with palpitation; in such cases alkaline medicines give immediate relief. When it cannot be referred to such causes as these, but rather to nervous irritability, we must have recourse to antispasmodics, as valerian, castor, and assafœtida, with morphia, or prussic acid. Prussic acid, and digitalis in combination, answer extremely well. In some cases a course of tonics is often the best resource, and no medium of that class is preferable to the sulphate of iron with aloes, or with the compound galbanum pill.

We shall now proceed to notice the influence of gastric disorders upon other organs.

1. *The intestines.* Setting aside the special sympathy existing between these organs and the stomach, as parts of the digestive apparatus, it is obvious that the action of the stomach upon the food being the first of a series of changes, and preparatory to those which occur in the other divisions of the canal, a fault in the first stage of the process must interfere with those which are subsequent. Thus it is the office of the duodenum to act upon chyme, but if this is imperfectly elaborated, the change in the duodenum must be likewise imperfect, even supposing that this viscus were not disturbed by the presence of matter ill-adapted to its sensibility. But the latter result very frequently ensues. The undigested matter either acts as an irritant to the mucous membrane or follicles, or is negatively injurious by the absence of the kind of stimulus requisite for the secretions of the bowel, as well as for those of the liver and the pancreas. In its further progress it produces similar results, till it arrives at the cæcum and colon, where it occasions either diarrhœa or constipation, according as it gives rise to irritation, or by its deficiency in certain principles (particularly in the bile) fails to excite the peristaltic motion, or the follicular and other secretions of the mucous membrane. Such mischief might be expected by one conversant with the physiology of the alimentary canal, but it is proved by the symptoms which occur in dyspeptic cases.

The intestines participate in disorder of the stomach not only through the contents of the latter, but also by sympathy. The continuity of the mucous membrane renders them liable to the extension of irritation from the stomach, but this happens particularly in the duodenum. In the large intestine, however, we may sometimes infer an opposite condition of the mucous membrane, from the constipation attendant upon gastritis, as if the greater afflux of blood to the stomach caused a state approaching to anæmia of the bowel. In some instances, the rapid communication of disorder from the stomach to the colon seems to depend on the sympathy of contiguity; as, for example, when upon the ingestion of food which occasions nausea and uneasiness, the patient is seized almost at the same time with tormina, and desire to go to stool.

2. *The liver.* The frequent conjunction of gastric and hepatic disease may sometimes perhaps be accounted for by functional sympathy; but it is probable that the duodenum is in most cases the medium of communication. Structural disease of the liver, consequent upon chronic gastritis, has been referred to inflammation of the veins. That this may occur in some instances we do not doubt, but in the majority of cases we think it probable that the greater quantity of blood transmitted from the inflamed membrane, may cause plethora of the portal circulation, and in this way lead to more serious disease.

3. *The organs of respiration.* The disorders of this system most commonly associated with gastric disease may be classed under three heads: 1, Spasmodic, 2, Catarrhal, and 3, Organic. To the first belongs the hard dry laryngeal cough of inflammatory dyspepsia; the *laryngismus stridulus,* incident to gastric irri-

tation in the infant; and the spasmodic dyspnœa or asthma, not unfrequently attendant on chronic derangements of the stomach. The distribution of the pneumogastric nerve sufficiently explains these sympathies. The catarrhal diseases are bronchitis, acute and chronic, and bronchorrhœa; the former commonly associated with gastritis in its different degrees; the latter causing the loose morning cough of the dyspeptic. In what degrees these affections are dependent on the sympathy of mucous membranes in general, or on one of a more special description existing between the stomach and the lungs, and maintained by the ganglionic nerves, we do not presume to determine.

The disease of the pulmonary structure which most frequently ensues upon stomachic disorder, is tubercle. The first production of this disease, so far as it is dependent upon, and not merely concurrent with, gastric disorder, is best explained by the deterioration of the blood consequent upon the latter.* After this change has been produced, the bronchial or pulmonary congestions, sympathetic with that form of subacute or chronic gastritis to which strumous habits are liable, may lead directly to the morbid deposit. The subsequent changes in the tuberculous disease, with the accompanying bronchitis and pneumonia, are greatly exasperated by gastric irritation.

4. *The heart.* The cardiac affections dependent on disorder of the stomach, are chiefly if not entirely functional, consisting of palpitation, syncope, and irregular or intermittent action. It is true that functional palpitation may induce hypertrophy in the same way that increased action of other muscles will augment their nutrition; but the latter change is then connected only indirectly with the morbid condition of the stomach. The juxtaposition of this organ and the heart will account in some measure for their close sympathy, independently of the nervous connexions; and even the mechanical condition of the stomach must produce considerable influence on the heart, as when, for instance, distended with food or flatus, it presses the diaphragm upwards. When the structure of the heart is in any way diseased, one of the surest methods of averting the paroxysms of functional disturbance, is to prevent irritation of the stomach.

5. *The brain.* The symptoms of deranged sensation and motion detailed under chronic gastritis, dyspepsia, gastralgia, evince the extent to which the function of the brain may be involved in diseases of the stomach, in cases of recent disease.

In cases of recent disease, the cerebral irritation excited by gastritis is sometimes so intense, as to supersede or to withdraw attention from the primary disorder. The chronic affections, hypochondriasis, melancholia, and even mania, have appeared to be removed or mitigated by treatment directed solely to the digestive organs. The headache occasioned by the digestive process has been often referred to a congestion of the brain, sympathetic with that of the stomach; but in many cases we are convinced that it is more of a neuralgic nature, the pain being limited to particular regions of the head, as to one eyebrow, to the occiput, to the mastoid region, or to the vertex; and often accompanied with superficial tenderness. The occurrence of apoplectic fits, soon after a meal, seems to imply a direct sympathetic determination to the brain; but we incline to the belief, that these attacks are mainly owing to the increased force of the circulation, produced both by the increased action of the heart, and the augmented mass of the circulating fluid generally.

6. *The spinal cord.* Derangements of motion produced by irritation of the spinal cord very frequently accompany gastric affections; such are tremours, partial paralysis, and convulsion. The last of these combined with coma, in the form of epilepsy, are especially common in early life. Tetanus has been traced to acute gastric inflammation. Chorea and the convulsive movements of

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* In cases of this description the duodenum, and other parts of the intestinal trunk are generally implicated, as in the strumous dyspepsia so faithfully described by Dr. Todd.—*Author.*

hysteria afford many examples of the connexion of spinal disorders with morbid conditions of the stomach.

7. *The skin.* The cutaneous diseases most frequently observed in conjunction with gastric disorders have been already noticed. We shall only now remark that this class of maladies will furnish many instances of the opposite principles of revulsion and sympathy : for while, on the one hand, the most inveterate forms of skin disease run *pari passu* with the disease of the stomach, it not unfrequently happens that the supervention of the former causes the latter to disappear ; while their subsidence is soon followed by a return of the gastric malady. This observation is not confined to diseases of the skin ; thus we have known asthma not only concurrent with dyspepsia, but vicarious of it.

GASTRALGIA.

Symptoms.—Complications.—Nature.—Causes.—Treatment.

THIS affection corresponds to the gastrodynia and cardialgia of some authors, the morbid sensibility of the stomach described by Dr. James Johnson, and the irritable gastric dyspepsia of Dr. Todd. It is characterized by pain in the epigastrium, but as this is a symptom common to other affections of the stomach, it is requisite to describe the nature of the pain and the attendant symptoms which distinguish what is meant by gastralgia. The pain is generally acute, and capricious in its accessions. Thus at one time it is greatly increased, at another diminished by food. The former effect is more common, and the degree of it is often such that the patient dreads the time of eating though his appetite is craving. Pressure is generally a relief, but not so invariably as some authors represent it to be. The pain often extends to the left side and between the shoulders, and is accompanied by pulsation in the epigastrium. There is seldom any fever; on the contrary, the patient often complains of coldness. The tongue is generally clean, though apt to be pale. The bowels are costive, the urine is for the most part unaffected, but in some cases we find it more copious and colourless than usual. The temper is irritable and captious. The sympathies in distant organs add dreadfully to the sufferings of the patient. Such are headache of a tense character, neuralgic pains in the arms, spasms of the bladder and rectum, shooting pains in the testes, priapism, &c.

When the disease has been of long duration, the subject of it becomes a prey to morbid gloom. His ideas are all pervaded by sadness, and they borrow this character from an ever-present conviction of the miserable condition of his health, which even in the intervals of pain he never forgets. That happy unconsciousness of bodily organs which belongs to sound health, is now unknown to him. He has acquired an irrepressible habit of attending with intense earnestness to his corporeal sensations. Even the external world becomes a dismal reflection of his own mind.

Gastralgia is often complicated with chronic gastritis, and with gastrorrhœa ; in its uncomplicated form it is distinguished from other diseases of the stomach by the circumstance, that the pain is the predominant symptom, and that, this being overcome, the attendant local evils also give way. The food is digested without difficulty ; there is no nausea, no distension, no heartburn. Moreover, we do not observe the febrile symptoms and cutaneous diseases attendant on chronic gastritis, nor the emaciation, and sallow complexion, characteristic of carcinoma. The diagnosis will be much facilitated by considering the habit of the individual, and the circumstances to be mentioned presently as predisposing causes.

Nature. Pathologists are pretty well agreed in referring the symptoms of

this malady to some alteration in the gastric nerves corresponding in many respects to that which produces neuralgia in other parts of the body.

Causes. Females are more frequently attacked by gastralgia, because they more frequently possess the neurotic irritability, and are also subject to causes of debility, which particularly dispose to this disease. No age perhaps is exempt, but we rarely observe it in children or persons far advanced in life. Deficiency and depravation of food, hæmorrhage, profuse discharges from the mucous surfaces, anæmia, chlorosis, diseases attended by long suffering, often induce a general susceptibility in the nervous system, which only requires a slight local irritation to develope the disease under consideration. The neurotic diathesis, which has been described elsewhere (See PATH. INTRODUCT.) may be inherited or acquired. As the product of outward circumstances acting upon the mind, we every day see it exemplified in persons whose pursuits involve a constant strain upon the energies of the intellect, and call into play the struggle and anxiety of strong contending emotions. Such are the violent alternations of hope and fear, confidence and doubt, ambition and despair, experienced in the agitations of politics, and in the competitions incident alike to professions and to commercial occupations. This subject the reader will find admirably illustrated in Dr. James Johnson's work already adverted to.

The *exciting* causes are for the most part such as act locally upon the stomach. The use of indigestible substances, such as crude vegetables, or fruit, dried salt meat, oily fish, &c. will easily bring on the disease where the predisposition exists. The same may be said of stimulant potions, and very cold liquids. When the morbid irritability is once established, it is astonishing to observe what slight causes may induce an attack of pain. A trifling surprise, an angry word, the least opposition to the wishes, will produce this effect in an instant, through the sympathy between the brain and the stomach. The agents of a local operation it is impossible to enumerate, for every article of food or medicine may be a cause of offence, even those which are apparently most bland and soothing. The cases met with among the working classes may generally be traced to the combined influence of excessive labour, a vitiated atmosphere, and scanty or innutritious diet. Dr. Kay observes (*North of England, Journal,* 1830), " That much must be attributed to the qualities of the diet is obvious, since comparatively few cases of gastralgia present themselves amongst that class of operatives which received better wages, obtains a simple and better diet, and whose members are more regular in their habits. Meagre food cannot fail, in the circumstances alluded to above, to derange the process of chylifaction, to disorder the digestive organs, and to impair the functions and morbidly increase the organic sensibility of the stomach and intestinal canal, thus inducing Dyspepsia, Gastralgia and Enteralgia."

Treatment. The objects are, 1, to subdue the local irritability ; 2, to prevent occasion of disturbance ; and, 3, to correct the general habit.

For the fulfilment of the first indication, the remedies to which we naturally have recourse, are narcotics. Prussic acid and morphia are those on which most reliance may be placed ; but in some cases the weaker substances of this class, such as henbane and hops, answer better. Stramonium is a valuable remedy, alone, or in conjunction with belladonna. But we must remember that sedatives are to be administered not only to quell the pain, but also to blunt the sensibility of the nerves, and thus to gain time for the use of measures calculated to produce a more permanent impression upon the system. Thus it is useful to combine morphia with aqua calcis, morphia with bismuth, opium with sulphate of iron, &c. The addition of nervine medicines is occasionally serviceable as of camphor, assafœtida, and musk.

There is one medicine often given to effect the present indication, which does not fall under the list of sedatives. We allude to the nitrate of silver, first introduced as a remedy for this disease by Dr. J. Johnson. This distinguished physician was led to the exhibition of the medicine by observing its great power

of lessening irritability on other tissues, and he seems to think that it acts specifically upon the nervous extremities. Induced to employ it by Dr. Johnson's recommendation, we have found it a most valuable resource in a great variety of stomach affections ; but our experience inclines us to think it more efficacious in certain cases often met with in practice, which present a combination of nervous irritability with chronic or passive congestion ; and we therefore attribute its good effects rather to its action upon the capillaries than upon the nerves, and this view seems to us to be more in accordance with its known efficacy in diseases of parts more subject to actual observation, as the conjunctiva, the mouth and throat, the rectum, the urethra, and the skin.

Upon the external use of anodynes, we have nothing to urge in addition to what has been said under gastritis and carcinoma.

2. This indication involves the difficult subject of diet. The difficulty consists in reconciling the local with the general treatment, for the articles which tend to invigorate the system are unfortunately those of which the stomach is least tolerant. We cannot for instance expect to make much progress in the cure of an anæmial hysterical subject, if in order to avoid irritation of the stomach we keep her upon farinaceous food, and withhold tonics ; the plan which we have found most practicable, has been to begin with a very light kind of aliment, such as gruel thoroughly boiled, arrow-root, rice, or the composition sold under the name of farinaceous powder, using at the same time the sedatives of which we have spoken, and procuring a regular and healthy operation of the bowels by mild laxatives and enemata. Having thus subdued the excessive irritability of the stomach, we venture to order broth or soup for a day or two; but we never feel satisfied till we have induced the patient, often in strong opposition to his preconceptions, to try solid tender meat, which may be taken with bread only, and a little weak brandy and water. It will often be necessary to encourage him to continue this diet in spite of the uneasiness which it at first occasions; and he is generally rewarded for his perseverance. In some cases, indeed, it is the kind of diet which produces least inconvenience ; while a farinaceous or fluid meal, leaves a degree of flatulence and distension, as intolerable as pain. Nay, in a few instances, a meat dinner has actually subdued the pain which had previously existed ; but we have had reason to suspect that in these cases the pain had been more spasmodic than neuralgic.

There are extreme cases, in which the stomach is for a time the conqueror in the strife, and in which we are compelled to humour it, either by giving such thin nutriment as whey, or light curd, or isinglass dissolved in water ; or by the *trimming* diet, so named by Dr. Cheyne, and strongly advocated by Dr. Todd. (*Cyc. Prac. Med.*, art. INDIGESTION.) Our embarrassment is often increased by the fickle vacillating conduct of the patient, who flies from one article of food to another without duly ascertaining their comparative fitness, vainly hoping that every change will discover something better adapted to his case than the last. And thus, after making an infinity of trials, his experience is good for nothing, for not one of them has been properly conducted. We must instruct him to persevere with the kind of food which we judge most suitable, in spite of the uneasiness which it may at first occasion, because into a stomach so irritable nothing probably could be introduced which would not affect it painfully. Should it, after repeated and properly conducted trials, still produce the same effect, we must abandon it for another.

The same remark applies to the medicines which we administer, and even those of a sedative kind. Their first contact with the stomach is often painful, and this effect we must remember may depend as much on the menstruum as on the principal ingredient. The very temperature is of importance. Not long ago we had a patient who suffered intense pain in the epigastrium, followed by spasms in the extremities if he took his medicine cold. This case was an extreme one; his irritability arrived at such a pitch that the least disturbance

of his system, the most trivial change of diet or medicine, the slightest shock of surprise and vexation, would induce the gastric anguish conjoined with palpitation, a state of mental agitation almost amounting to delirium, cramps in the legs, and violent priapism. His sufferings at times were such, that he felt a strong inclination to suicide.

3. We have already hinted at the difficulty of pursuing the third indication on account of the morbid sensibility of the stomach. Tonic medicines and a bracing diet are strongly indicated by the general habit; but it is clear, from what has been said, that great caution must be exercised in employing them. By attempting too much at first we shall not only be foiled in our purpose, but the patient's confidence will be lost, which in diseases of this character it is most important to possess to an unlimited degree. We may prepare the way for more decided corroborants by enforcing attention to a variety of little details in the general management, all more or less conducive to the desired result. Thus we must recommend the selection of well-ventilated chambers, and see that the patient sleeps on a hair mattress, that he is frequently in the open air, that he takes regular exercise, observes early hours, avoids tea, coffee, tobacco, or other debilitants of the nervous system; that his room is well lighted, and that he has cheerful society. He must be sprinkled with tepid or cold water every morning, and by degrees brought to the shower bath. If left to his own devices he will recline on a bed of down; curtains and blinds will be drawn to exclude the light, and every avenue of sound from without will be stuffed up; he will refuse to go abroad from fear of incurring some painful impression, and for the same reason will withdraw himself from all society, even of his own family. By such means he will infallibly multiply his morbid sensibility a hundred-fold. His general habit will pass into a state similar to that of one of the organs of sense which has been long deprived of the usual stimuli by mechanical obstruction, the removal of which soon informs the subject how sensibility is sharpened by disuse. To counteract such inclinations will require on the part of the practitioner no little firmness, conjoined with persuasiveness, vigilance, and patience, as well as that quality which perhaps is *instar omnium*, viz. *tact*.

Bismuth is certainly the most effectual amongst the mineral remedies which have been recommended for gastralgia. The dose, however, should be larger than is often given; beginning at three or four grains, three times daily, it should be gradually increased to ten.

G.

GASTRORRHŒA.

Symptoms.—Causes.—Nature.—Treatment.

This term has been applied by French writers to cases in which large quantities of mucus are secreted by the stomach, without any inflammation of its lining membrane. We shall use it, however, in a wider sense, to include all those cases of functional disorder of the stomach, in which ejection of the fluid by vomiting or eructation is the predominant symptom. It is needless to remind the reader that gastrorrhœa is often entirely secondary to, or a mere attendant upon, the diseases which we have already considered.

The fluid most commonly ejected is thin, glairy, insipid, and very like saliva; in other cases it has more of the properties of mucus: it is nearly always alkaline. The quantity thrown off varies from an ounce or two, to a pint, and upwards. When pain or a burning sensation precedes the discharge, it is called pyrosis, popularly water-brash. In some districts from its frequent association with flatulence it is called " the wind and water."

The affection generally occurs early in the morning, at other times when the stomach is empty. Persons are most subject to it after puberty. In females we have known it as an accompaniment of pregnancy. The cause which more than all others induces the disease is the exclusivive use of farinaceous, and vegetable food, especially when combined with alcoholic drinks. Hence its frequency in Scotland and Ireland, where oatmeal and whiskey, or potatoes and the same liquid, are the meat and drink of a large portion of the poorer classes of the population.

Nature. Gastrorrhœa is a catarrh from the mucous membrane of the stomach, bearing the same relation to this organ as mucous and serous diarrhœa to the intestines, pituitous catarrh to the bronchial membrane, leucorrhœa to the vagina and uterus, &c. The precise pathological condition of the secreting parts is not better known than that of the parotids in the chronic salivation of hysteria and pregnancy, or of the kidneys in diabetes.

Treatment. The diet must be firm, dry, and compendious; containing a large proportion of animal food. The various stomachic remedies adverted to in previous sections may be useful, such as rhubarb, the vegetable bitters, and carminatives. Sedatives must often be administered on account of the accompanying gastralgia. Nitrate of bismuth has long enjoyed a high reputation as a specific. It is a valuable resource; so also is nitric acid combined with Inf. Calumb. or Inf. Lupul. with T. Cardam. Co. But the medicine which, in our hands, has been most successful, is nitrate of silver in doses of a grain twice or thrice a day. We can also bear testimony to the value of the Tinct. Benz. Co., which was a favourite remedy of Dr. Baillie. Bismuth may be given in conjunction with morphia and rhubarb powder. Some authors speak highly of sulphuret of potass, but we have no experience of its virtues.

The use of these gastric remedies must be preceded by warm purgatives, diligently followed up, until the evacuations have assumed a healthy appearance. On this subject Dr. Barlow of Bath has some excellent practical remarks in his essay upon Gastrodynia (*Cyc. Prac. Med.*), in the pathology of which disease he is of opinion, that excessive secretion of mucus forms a very prominent part. His observations apply particularly, in our judgment, to cases presenting the very common complication of gastralgia with gastrorrhœa.

INFLAMMATION OF THE DUODENUM, OR DUODENITIS.

Acute.—Chronic.—Duodenal dyspepsia.—Structural diseases of the duodenum.—
Treatment of duodenal diseases.

THE *anatomical characters* of this disease differ so little from those of inflammation of the stomach and of the ileum, that it would be a waste of time to dwell upon them here. We shall only remark that the elevated patches which occur, both in the acute and chronic forms, are caused by turgescence or hypertrophy of the *glandulæ conglomeratæ Brunneri*, which abound in this division of the intestine. We distinguish them from the true glands of *Peyer*, which are confined to the lower part of the canal, by their irregular form, while that of *Peyer's* glands is elliptical.

1. *Acute duodenitis.* The *symptoms* are by no means so characteristic as to enable us to recognise this form with certainty; and it may be doubted, whether *acute* inflammation is ever confined to the duodenum. We may suspect its coexistence with gastritis, when there are signs of bilious obstruction in the skin and the excretions. The jaundice, met with occasionally in gastro-enteric fevers, is connected with inflammation of the duodenum. But the exact mode of the connexion has not been thoroughly ascertained. Sometimes the bile duct is obstructed by the swollen state of the membrane, or by the accumulation of

viscid mucus. In other cases, the inflammation appears to have extended along
the lining membrane of the duct. In many neither obstruction nor inflammation
can be detected in any part of the tubes; and then the jaundice must be referred
to a sympathetic congestion of the liver. It is true that congestion and inflam-
mation of the liver may exist without jaundice; but the liver is an organ so com-
plex that it is easy to conceive that one sort of congestion may alter the secre-
tion very materially, though another does not. Thus, the sympathetic irritation
alluded to might, upon analogy, be expected to increase the determination to the
extreme branches of the vena portæ, and consequently to induce an excessive
secretion of bile, which, if not removed with proportionate activity by the excre-
tory ducts, enters into the general circulation and tinges the skin; for, in many
of the cases in which yellowness of the skin supervenes on fever, the stools are
perfectly bilious.

2. *Chronic duodenitis* is more frequent than the acute form. It may be an
accompaniment or a consequence of chronic gastritis. The diagnosis of the
complaint is difficult, on account of the functional connexion of the organ with
the stomach, liver, and pancreas, and from its contiguity to the colon. We
have reason, however, to suspect that it is the seat of disease, when pain is not
felt till two or three hours after a meal, or when it is continued beyond this
time (as in the complication of duodenal with gastric inflammation;) when there
is also pain in the right hypochondrium and the right scapula; when the stools
are crude, fœtid, pale, or of a dark-green hue; when the skin is yellowish or
muddy, and the urine dark-coloured or of a dull orange hue. These symptoms,
it is true, belong also to chronic hepatitis; but we may, perhaps, distinguish
them from the latter by the seat of tenderness, which is referred to the space
between the hypochondrium and the mesial line. An enlarged liver might
cause tenderness in the same situation, but then it would be perceptible to touch
and percussion. Cases in which duodenal disease is suspected, should be
examined when the stomach is empty, and after a free evacuation of the colon.

The sympathetic derangements in duodenal are scarcely less extensive than
in gastric disease. The heart, however, is less frequently affected. Headache
is a very common attendant, but instead of occupying the whole superciliary
ridge it is more frequently confined to one side of the forehead, or even the
parietal region. Pains in the back, sensations of numbness in the side, or of
weakness in the lower extremities, sometimes simulating paraplegia, or partial
hemiplegia, are oftener met with than in gastric cases. The cutaneous accom-
paniments are various forms of Ephelis, Acne, Herpes, and Pityriasis: in our
experience, the two first of these have been most common.

The follicles of the duodenum are, in many cases, the principal seat of
disorder; which is evidenced by discharges of mucous substance varying in
tenacity from the consistence of jelly to that of concrete albumen. Such
matters may, it is true, be derived from the follicles of other portions of the
tube, but they are referred to the duodenum when they concur with other signs
of disorder of this organ. The accumulation of the glutinous secretion may
give rise to attacks of severe pain almost amounting to that occasioned by gall-
stones. Such seizures are generally followed by jaundice.

3. *Duodenal dyspepsia.* There is a state of the duodenum corresponding
to that which in the stomach produces dyspepsia, without any inflammation or
structural alteration. It is called *bilious dyspepsia* by Dr. W. Philip, *duodenal
dyspepsia*, by Dr. Todd, and it answers to what is so often spoken of under the
terms bilious disorder, hepatic derangement, chylopoietic disorder, liver disease,
&c. The functional symptoms are the same as in inflammation of the viscus;
but the disease is judged to be functional only, when the tongue is pale, though
coated, the duodenal region not tender on pressure, the skin relaxed and moist
rather than harsh and furaceous, and the body not emaciated.

The duodenum becomes diseased under agencies similar to those which affect
the stomach. The more special exciting causes are substances passing undi-
gested from the stomach, and irritating, or even accumulating in the duodenum.

Such are fruits, crude vegetables, the harder animal substances, particularly salted meats, the tegument of fish, &c.

4. The *structural diseases* of the duodenum most frequently met with are ulceration and carcinoma; but their diagnosis, from similar disease of the stomach, liver, and pancreas, is all but impracticable.

The *treatment* of duodenal disorders must be conducted upon the same general principles as that of the gastric; but the evacuation of the bowels and the quality of the secretion will demand more particular attention. It is a great object to choose aperients which do not confine their operation to the great intestine; senna, sulphur, castor oil, and the neutral salts, are the most eligible. They may be combined with bitter infusions, according to circumstances. Alterative doses of blue pill, Hydr. c. Cretâ, and compound calomel pill combined with henbane, or Dover's powder, are particularly useful. But it is judiciously observed by Dr. Todd, that the common practice of exhibiting at the onset a mercurial, and then an aperient, is not the most successful. The alterative agency has a much better chance of attaining its object when accumulations have been previously removed. We can speak highly of very small doses; for instance, half a grain of blue pill every night, continued for a considerable time. When there is an objection to mercurials, as in strumous subjects, we have found the combination of nitre in small doses, as recommended by Dr. Philip, with extract of taraxacum, an excellent substitute.—(℞. Pot. Nit. gr. v., Extr. Tarax. gr. xv., Inf. Rhei, 3x., Tr. Lav. Co., Sp. Amm. Co. āā 3ss, Tr. Hyos. ℳ xv. M.)

When no inflammation is present we have found the croton oil, *in very minute doses*, a most valuable resource, both as an aperient and in procuring bilious secretions. When there is reason to suspect that the duodenum is clogged with mucus, from a depraved condition of the follicles, the best remedy is lime-water. We have known the most obstinate jaundice removed by this medicine in conjunction with minute doses of croton oil.

The use of warm baths, friction of the abdomen, and exercise, especially on horseback, are useful adjuvants. The tepid shower-bath may be employed to remove some of the secondary ailments, but the nitro-muriatic pediluvium, so much extolled by some practitioners, is at best an uncertain help.

A timely application to the mineral waters of Cheltenham, Harrowgate, Marienbad, and Carlsbad, will save much medicinal treatment in all cases: even the more obstinate may yield to these, when artificial mineral waters have been altogether fruitless. The change of air, fresh scenes, and occupations, involved in excursions to the above places, may doubtless contribute to the beneficial result; but it is a great mistake, proceeding from inaccurate observation of the influence of mineral waters, to assign the good which they effect to collateral circumstances.

Defective digestion in the duodenum has often appeared to bear the relation of cause to the obstructions of the cæcum and colon so common in young females, and through this medium also to be connected with suppression or deficiency of the catamenia. And when we consider that chylification begins in this viscus, it is obvious how prejudicial an influence its diseases must exert upon the nutrition of the whole body. The deterioration of the blood shows itself in the tuberculous cachexia, consequent upon duodenal dyspepsy, even in subjects not predisposed to it by inheritance; but still more frequent and deadly is the relation between this disease and the tuberculous formations incident to hereditary struma.

Duodenitis cannot be recognised with certainty—especially if it be acute. This form is, however, much less frequent than the chronic variety. In either case the symptoms of duodenitis are rather connected with the liver or stomach than the duodenum proper; and in post mortem examinations, no portion of the intestinal canal is so frequently in a sound condition.   G.

ILEO-COLITIS, OR ENTERITIS.

General observations.—Anatomical characters.—Symptoms.—Acute or subacute—Diagnosis from typhoid fever.—Chronic.—Causes.—Treatment.—Acute.—Chronic.

THE *jejunum* is not, as far as we know, liable to primary disease, and even enjoys a singular degree of immunity from secondary complications. We shall treat of inflammation of the ileum and colon under one head, because inflammation rarely attacks the former, without extending to the latter, though the converse is not equally true. Ileo-colitis corresponds to the enteritis or muco-enteritis of many authors.

This disease is extremely various in its intensity; in some instances so slight as to pass under the name of diarrhœa; in others, threatening the most serious disorganization in the intestine, as well as attended with general symptoms of great severity. This difference in degree is, in the acute disease, generally connected with the kind of inflammation, whether common or specific; and this again has reference to the part of the tissue affected. It will be seen that the morbid appearances are distinguishable into two species; the one belonging to the villous coat, the other to the follicles. Simple inflammation, or that dependent on the common causes of disease, such as exposure to cold or humidity, suppression of perspiration, irregularities of diet, &c., attacks the membrane generally, while the *specific* inflammation excited by poisons introduced into the system, whether by contagion, or an atmosphere vitiated by malaria, or by human miasma, appears to engage the follicles in preference. Were it possible to inspect the mucous lining of the intestine at the commencement, and during the course of exanthematous and other specific fevers, we entertain little doubt that the attendant enteric inflammation would present appearances not less distinct than those which in the skin respectively characterize rubeola, scarlatina, variola, varicella, &c., and dependent on the particular class of follicles, or other components of the mucous tissue, which are especially affected by the morbific cause. But as the characteristic forms of the eruptions fade or become confused after death, unless vesicles or pustules have been formed, so we fail to discover on the mucous surface analogous peculiarities, unless the follicles have undergone alteration. But even as it regards these, much remains to be investigated; for although it has been ascertained that a certain change in Peyer's glands belongs to one form of typhoid fever, and another change to tuberculous phthisis, we have yet to discover what are the forms of fever in which the other sets of follicles are more particularly engaged, or in which the follicles escape disease altogether, the inflammation or congestion having been of that kind which corresponds to the papular or to the diffuse forms of cutaneous eruptions.

Anatomical characters of acute Ileo-colitis. The remarks already offered on the general appearances of gastro-enteric inflammation, need not now be repeated. The peculiarities observed in this tract of the canal under present consideration have reference to the form of certain elevated patches, and of the ulcerations. The forms met with in the ileum are oval, and circular; in the colon circular only. These differences are caused by the parts affected. The isolated follicles found both in the ileum and colon, when turgid from inflammation or its products, present a button-like pustular appearance; but the agminated glands of *Peyer* which are confined to the ileum, have an elliptical arrangement, which becomes very manifest in their distended or eroded condition. In some cases the isolated glands are extensively affected, while the agminated altogether escape, and *vice versâ*. If the disease is intense, the ulcerative process extends to the adjoining mucous membrane, the destruction of which causes

the separate follicular ulcers to coalesce, and in this way the forms may appear extremely irregular. Inflammation of the villous membrane, independently of the follicles, is betokened by mere redness, softening, irregular abrasions, hypertrophy, flakes of coagulable lymph, and hæmorrhagic infiltration. In some rare cases, a uniform blackness, the effect of gangrene, is observed. The membranous kind of inflammation, as distinguished from the follicular, is more frequently observed in the colon.

The acute follicular inflammation constitutes the dothinenteritis of M. Bretonneau, and the *exanthême interne* of Andral and others. There is great reason to believe that it is of a specific nature, and that it occurs only in fevers. Certainly the limitation of the disease to the elliptic patches of Peyer is observed in no other acute malady than typhoid fever, and it is remarkable that according to M. Louis, it never occurs after the age of fifty. The particular changes which these glands undergo, such as the formation of a white deposit under the mucous membrane, the gradual destruction of this matter, and of the membrane itself, are treated of under the pathology of fever. MM. Louis and Chomel consider it a constant lesion in typhoid fever, but though an occasional complication of fever of this country it is by no means invariably present.

We have rarely had an opportunity of witnessing the appearance of acute ileo-colitis, except as complicated with the follicular inflammation of typhus, or as secondary to disease in some other organs. In its simple form the disease is very seldom fatal.

The appearances in acute *colitis*, or dysentery, are patches of redness, with coatings of lymph, tough mucus, or pus, minute or wide—spreading irregular ulcerations, intersected by stripes of mucous membrane, which have escaped erosion, and thickening of the membrane amounting sometimes to fungous vegetations. In some rare cases the membrane has been covered with minute vesicles, on the surface of which there were flakes of fibrinous matter. The vesicles may have been minute follicles in a state of turgescence.

Acute ileo-colitis hardly occurs as a primitive disease. It is true that, in severe cases of dysentery, the inflammation extends from the colon, which is the primitive seat of it, to the lower portion of the ileum, and involves both the follicles and the surrounding membrane. But the ordinary cause of ileo-colitis is typhoid fever, and in that case, the follicles are primitively attacked, and the intervening membrane escapes entirely, or at least is but slightly inflamed. Hence we rarely see the acute form of the disease, except under these two forms.

The lesion of the follicles which occurs in typhoid fever, is evidently peculiar—we might almost say, specific, for the lesion is more deeply seated than under any other circumstances, and extends rather to the cellular than to the mucous tissue. It is therefore quite in anatomical characters, and also in symptoms from the enteritis, which occurs as a simple idiopathic disease, that is, ordinary dysentery or diarrhœa. The comparison instituted by Dr. Louis between these two disorders, seems at present out of place, because every one admits that they are essentially distinct; but when his book was written the minds of men were directed to the study of the writings of Broussais, and many were disposed to regard the two diseases as nearly identical.

One object of the labours of Dr. Louis was to ascertain what were the anatomical characters of typhoid fever: these he proved to be the inflammatory alteration of the follicles of the ileum, but he did not prove conclusively, that the greater part of the symptoms depended upon the follicular disease; on the contrary, it is very probable, that with the exception of the diarrhœa, and perhaps the pain, the symptoms are not connected with the mere local affection, but that the intestinal disease is a mere part of the local disorder.

In a few cases of exanthematous disease, and even in ordinary acute diseases, we occasionally meet with a superficial inflammation of the follicles, but this is merely confined to the mucous membrane, not including the cellular tissue.   G.

2. In *chronic* ileo-colitis, besides the softening, thickening, and ulceration which it exhibits in common with the acute form, we find induration, and the

brown and slate-coloured tints. The latter are not unfrequently the only morbid appearances, or are combined with a slight thickening of the membrane. The brown hue must not be confounded with the stain of feculent matter. The slate-colour often passes into black, and then resembles melanosis; it is generally distributed in dots, or in very fine reticulated striæ. In severe cases of long standing, the whole calibre of the large intestine has been found contracted by the inward growth of the hypertrophied mucous membrane.

Chronic ulceration confined to the glands of Peyer, occurs only in tuberculous cases. In other cases the isolated follicles in the ileum, as well as in the colon, may undergo similar changes; but the latter is by far the most frequent seat of such disease.

The depth to which ulceration extends, both in the acute and chronic cases, is various. In some, we observe only a small opening in the centre of a furuncular excrescence; in this form, the principal lesion is the distension of the follicle itself with the morbid deposit or secretion; and the ulceration has but just commenced around the mouth of the excretory duct. We have never observed it, but in cases of fever. In one remarkable instance, we found the cæcum and ascending colon, and a part of the arch, thickly studded with these excrescences, each having the size and form of the head of a brass nail; while the glands of Peyer in the ileum were proportionally congested, but had scarcely ulcerated. In other instances, the mucous membrane over the whole surface of the follicle, is destroyed; in others the glandular structure itself is destroyed, and the base of the ulcer is either cellular membrane, or the muscular coat; the edges being red or pale, and either hardened as in chancre, or flat and soft. Sometimes nothing but peritoneum is left at the base, the destruction of which by gangrene, or rupture, is the cause of the intestinal perforation which occasionally supervenes. The glands of the lower end of the ileum, both single and agminated, present the deepest ulcerations, and consequently are the most frequent, if not the only seat of the accident alluded to. (See PERITONITIS BY PERFORATION.) In nearly all cases of follicular enteritis, the lymphatic glands of the mesentery are swollen, and of a crimson or vermilion hue. Hence the fever in which such lesions occur was called by M. Petit, *entero-mesenteric fever*.

1. *Symptoms of acute and subacute ileo-colitis.* The most usual *local* symptoms are pain of a dull or griping character about the hypogastrium, and right iliac region, tenderness on pressure, and diarrhœa; the stools being of a thin, feculent character, sometimes mixed with mucus. Considerable heat, and sometimes a gurgling sensation, in the situation of the ileo-cæcal valve, may be felt when the hand is applied to the abdomen. Meteorism is not common in the idiopathic form of the disease.

There is generally fever, the skin however being often moist, and the pulse soft; the urine is scanty and high-coloured; the tongue often red at the tip and edges, and furred in the centre; though this appearance is by no means so constant as it was once thought to be. In severe cases, the crust becomes brown, or even black, the cheeks have a fixed red flush, and the eyes are dull; occasionally there is delirium succeeded by stupor; and in some cases, especially in the typhoid form, the cerebral symptoms entirely obscure the abdominal affection. It may be in many instances questionable, whether the symptoms belong to simple enteritis or to typhoid fever. The following table abridged from a summary of seventeen cases of typhoid affection, and twenty-three of enteritis, observed by M. Louis, gives a good idea of the diagnostic characters. (*Examen de l'Examen de M. Broussais*, p. 104.)

Typhoid Affection.	Enteritis.
Diarrhœa, in 14 cases out of 15.	In all the cases.
Abdominal pain in 8 out of 11.	In 22 out of 23.
Meteorism in 12 out of 17.	In 1 only of the 23.
Enlargement of the spleen in 11 out of 15.	In none.

Typhoid Affection.	Enteritis.
Epigastrium painful in 1.	Indolent.
Nausea in one case (in the erect posture).	In two cases the first and sixth day.
Anorexia in all.	In 5 out of 23.
Tongue thick and red in 3 cases, from the fifth and sixth day; dry and red in 2 others; dry and black in 1.	Sometimes whitish, without any other lesion.
Fauces, inflamed in several.	Healthy.
Headache in all.	In 1 slight.
Somnolence in 5.	In none.
Weakness remarkable.	Slight.
Dazzling sensations in 6.	None.
Noises in the ears.	None.
Deafness in 3.	None.
Vision disturbed in 7.	Healthy.
Epistaxis in seven-tenths of the cases.	None.
Rose-coloured lenticular spots in 15 out of 16.	None.
Heat excessive in all.	Slight in 4.
Pulse above 100 in 7 cases.	80 in 3, and from 70 to 50 in the rest.
Duration—25 days average.	3 to 4 days.
Mortality—one fifth.	None.
Age—average twenty-two and a half.	36.

Treatment.—One or two bleedings of 10 to 15 oz.; Syrup mucilage, Seltzer Water, and Linseed Enemata.

A quarter-lavement of Linseed and Opium; Rice Water: no bleeding except in one case, complicated with pneumonia.

It appears, therefore, that the typhoid affection differs not only in the kind and degree, but still more remarkably in the number of the symptoms. When in addition to these symptoms, we bear in mind that in the typhoid affection the glands of Peyer are specifically diseased, and very often without any inflammation of the surrounding membrane, while in enteritis, the inflammation is more membranous than follicular (the glands of Peyer partaking only secondarily of the inflammation which surrounds them), the distinction in the nature of the two diseases is still more decided.

The above analysis shows how mild were the cases of enteritis; not only by the recovery of the patients, but also by the success of the very gentle treatment. The disease would probably have been called in this country diarrhœa: indeed the ileo-colitis, under consideration, might not inappropriately be designated inflammatory diarrhœa. In many instances, it is probable that the congested state of the mucous membrane is so speedily relieved by the serous and mucous secretions, that true inflammation is not established. The unfavourable cases which have fallen under our notice have been generally complicated with pneumonic, bronchitic, or phthisical disease.

2. In *chronic ileo-colitis*, diarrhœa is the most prominent and constant symptom. The disease is often complicated with other maladies of long standing, particularly phthisis and carcinoma of the pelvic organs. But it may be simple, and have come on gradually, or supervened upon an acute seizure. The duration of the disease is indefinite, the symptoms continuing in a slight degree, but subject to transient aggravations, or occurring after periods of apparently complete health. In most cases there is a gradual loss of flesh; and, as the disease advances, hectic fever. The stools consist of thin feculent matter, or of small scybala mixed with sero-mucous or muco-purulent discharges. Sometimes there is bloody or sanious fluid.

It often happens, both in acute and chronic ileo-colitis, that a certain degree of inflammation coexists in the stomach. The disease is then called *gastro-enteritis*, and we recognise it by nausea, vomiting, and heat, with pain and tenderness of the epigastrium, in addition to the other symptoms. The febrile action is in such cases more intense than in the simple ileo-colitis, the brain more disturbed, and the tongue, in the acute form, more reddened and papillated; in the chronic, more rough and fissured.

Causes. The most frequent cause is a cold and damp air, or an epidemic condition of the atmosphere, known only by its effect. The latter is often observed to prevail in the autumn; and in some countries, especially within the tropics, the disease may be traced to malaria. Wet feet often induce an attack. Some articles of food produce the same effect; such are unripe fruits, certain vegetables, and salt provisions. Excess in quantity may sometimes be charged with the evil, though not unfrequently it may be traced to want of food; a fact which should warn us not to push abstinence too far in the treatment.

Treatment of acute ileo-colitis. In mild cases, the application of a few leeches to the abdomen, fomentations, mucilaginous drinks, and small doses of Dover's powder with Hydr. c. Cret., or rhubarb, according to circumstances, comprehend all that is necessary to be done. In severer cases, especially if the subject is plethoric, a general bleeding will expedite the cure; and a second or third application of leeches may be needful. We attach great efficacy to leeches applied to the anus, and believe that a smaller amount of blood is required when taken from this situation, in consequence of the more powerful derivation thus effected. When the stomach is irritable, we may substitute opiate enemata for the Dover's powder. But we must not be in haste to check the diarrhœa, except by means calulated at the same time to arrest the inflammation. The untimely use of astringents has often, by suppressing the secretion, aggravated the disease in the mucous capillaries. The warm bath is a useful adjuvant. The diet must consist of bland farinaceous substances, particularly rice and arrow-root.

When the diarrhœa continues troublesome, notwithstanding the inflammatory symptoms have abated, (a state of things indicated by a diminution of mucus in the stools,) the chalk julep with a little vin. ipecac. may be given.

In the treatment of the *chronic* form we must have recourse to frequent local depletion, unless the case is far advanced; and this may alternate with, or be assiduously followed up by counter-irritation, the most eligible form of which is repeated blistering. A mild mercurial course, sufficient to affect the gums, has often proved highly beneficial; but it is not desirable to attempt this treatment if we believe that chronic ulceration has taken place to any great extent.

In cases of long standing the diarrhœa is the grand evil, for the removal of which the patient is most anxious. But in these as well as in the acute form, it is not a matter of indifference by what means the desired end is accomplished. If suddenly effected by astringents, the patient complains of fever, headache, and pain in the abdomen; but this seldom happens, if a few leeches and a blister have been previously applied.

The medicines which exercise most control over chronic diarrhœa are Opium, Logwood, Catechu, Kino, Compound Tinct. of Benzoin, Cupri Sulphas, Plumbi Acetas, and Zinci Sulphas. They require frequent variation in their forms and combinations; and we must bear in mind the necessity of husbanding our resources, that is, of not using stronger means than are just sufficient to produce the effect at the time. For in the earlier stages, a single vegetable astringent, with cretaceous mixture, may do as much as in the more advanced periods can only be achieved by the most powerful combinations of metallic substances. Dover's powder, the Pulv. Cret. Comp. c. Op., the Pulv. Kino Comp., are excellent medicines in any stage.

When there has been reason to suspect ulceration low down in the colon and rectum, which is indicated by hasty impetuous evacuations, and a feeling of pain or irritation in the part, we have used an enema of from 5 to 10 gr. of nitrate of silver in 4 oz. of water, followed soon after by an emollient or opiate injection. Suppositories of opium are often retained, when enemata have been rejected.

The strength of the patient often requires to be supported by preparations of bark, iron, and zinc; and by wine, particularly old port. Pills containing one or two grains of quinine and half a grain of opium, with Ext. Gentian, have

sometimes acted beneficially, not only by imparting vigour and improving the appetite, but also as astringents, even when other medicines of this class had been useless. The muriated tincture of iron is perhaps the best preparation of the metal that can be employed in this disease.

The food should be as nutritious as possible, consistently with the avoidance of irritation. The farinacea and plain tender meat are the best articles. In many cases an exclusively milk diet is well borne, and is sufficiently restorative. Patients will soon be convinced, in opposition to their preconceptions, that they have a better chance of regaining flesh and strength under a diet judiciously limited in quantity as well as in kind, than under the systems of promiscuous and unbounded feeding, suggested by their shortsighted friends and relatives. Warm baths, warm clothing, particularly of the feet, and a swathe of flannel round the abdomen, are means not a little conducive to recovery.

COLITIS, OR DYSENTERY.

Symptoms of acute colitis.—Local.—General.—Of chronic colitis.—Diagnosis.—Prognosis.—Causes.—Treatment.

THE anatomical characters of this disease having been described in the foregoing chapter, we shall enter at once upon the history of its symptoms.

Symptoms of Acute Colitis. Uneasiness of the abdomen, soon amounting to pain of a griping character, particularly in the umbilical region (tormina), attended with an inclination to go to stool, and temporarily relieved by the evacuation, is, in most cases, one of the earliest local symptoms. Occasionally the inclination does not differ at first from what occurs in simple diarrhœa, and the evacuations discharged are feculent. As the disease becomes developed, the relief is but transient; the desire to go to stool is more frequent and importunate; the secretions are thin, mucous, and sanguinolent, mixed with nodules of scybalous matter; the blood is sometimes florid and pure, more frequently interspersed with shreds of mucus or albumen; sometimes it is only sufficient to give a dirty red tint to the rest of the fluid, and then it has been compared to water in which flesh has been macerated. The scanty evacuations now produce distress rather than ease, and the patient fancies that there is still something that should come away, and the expulsion of which would cure him, just as persons suffering long from nausea and vomiting, have a strong, but false conviction, that food still remains in the stomach, and beg for emetics. If the disease is not checked, the tenesmus and griping increase, and the abdomen becomes hot and tender. In an advanced stage the stools are fœtid and dark-coloured, and contain lumps of a whitish, pultaceous, or semipurulent character. The bladder, in severe cases, painfully sympathizes with the rectum, and hence the dysuria which occasionally attends the disease.

Among the *general* symptoms we must first take notice of the fever. This in the sporadic form of dysentery, is usually symptomatic only, and often delays its appearance till the local affection has assumed a considerable intensity; but in other cases the disease sets in with rigors, *malaise*, and the ordinary precursors of a febrile attack. The tongue is furred, and in bad cases covered with a dark crust, the fissures of which show a dull crimson hue beneath; the lips are often dry and cracked, and the countenance, as in nearly all abdominal maladies, indicates great depression.

We do not consider it worth while to describe, or even to enumerate, the various divisions of this disease, which authors have delighted to multiply. Like every other inflammation, particularly of the mucous tissue, it will take

its complexion from the physical constitution of the race, whether xanthous or dark-coloured; from the state of the system, as affected by climate, and by epidemic or endemic conditions of the atmosphere; from the individual temperament or habit, as inherited or acquired; from the general pathological states accompanying or following other maladies, such as hepatic and splenic diseases, scorbutus, &c., from the disease of which it may be but a complication, as typhoid fever, remittent fever, or rheumatism; and lastly, from the specific nature of the exciting cause, as malaria or contagion. To follow some authors through the varieties which they describe, would be nearly equivalent to studying all the diseases in the course of which the great intestine may become inflamed.

The severity and danger of the disease are co-extensive with the tract of intestine involved. In the milder form, there is reason to believe, though we have not absolute proof of it by *post mortem* observations, that the lower part of the colon, and perhaps by the rectum, are affected, and in such cases the symptoms are almost entirely local. We have, however, not unfrequently met with cases in which there was little general disorder, and the stools were neither very frequent nor very distressing, though quite characteristic, but in which there has been griping about the umbilicus, and a dull tenderness in that region on pressure. In such forms of disease the character of the inflammation is passive, and the subjects of it have generally a languid circulation. With this exception, our experience fully accords with the following judicious observations cf Dr. Abercrombie:—

"While it is limited to a defined portion of the lower part of the intestine, it may be a disease of little danger; but it is to be kept in mind, that its danger is generally in proportion to its extent. If it be attended with pain and tenderness extending above the pubes, and along the course of the descending colon, the case is becoming more precarious. If there be tenderness and tension extending along the epigastric region, so as to give reason to apprehend that the arch of the colon is involved in the disease, the case is more and more alarming; when there is reason to fear that it affects the whole course of the great intestine, the danger is extreme. There is generally, in this case, much constitutional disturbance, with quick pulse, thirst, anxiety, vomiting, hiccup, and rapid failing of the vital powers; the evacuations from the bowels vary in the manner which has been already referred to; being either mucous, watery, or feculent, or consisting of various combinations of these matters with each other." (*Dis. of the Stomach*, p. 220.)

The formidable cases alluded to in the latter part of this extract occur chiefly within the tropics; but they may be witnessed in our own climate, when there has been a concurrence of atmospheric and other causes to be mentioned presently.

Chronic Colitis. The symptoms of chronic dysentery differ so little from those described under chronic ileo-colitis, that we deem it needless to recount them here. We shall only add that the chronic form generally supervenes on the acute; that the fever is absent, or assumes, in an advanced period of the disease, a hectic type, and that the stools are more frequently sanguinolent and sanious than in ileo-colitis. Hepatic abscess has been often observed in connexion with the intestinal ulcerations of chronic dysentery; but whether this is caused by inflammation of the veins, or by the admixture of pus with the blood contained within them, or simply by that sympathy which exists between organs connected both by function and by contiguity, it is not easy to determine. The latter explanation, together with the peculiar nature of the portal circulation, would account for the converse influence of hepatic disease on dysentery.

Diagnosis. It is not easy to confound dysentery with any other disease. It is true that not always presenting at the commencement the peculiar stools or the tenesmus, it may be taken for simple diarrhœa; but the inflammatory symptoms which accompany it will show its cause and seat; so that in a prac-

tical point of view, it is of little importance whether we call the disease inflammatory diarrhœa, ileo-colitis or dysenteric colitis. The milder cases of dysentery (which might be termed ortho-colitis), derive their character, as we have seen, from the parts affected, and cannot be confounded with ileo-colitis; but the severer form, differing so little from the latter in its seat, and at first in the kind of dejections, is distinguishable in its progress by the intensity of the inflammation, and by the peculiarity of its products.

Cholera, in its indigenous form is distinguished by the bilious vomiting and diarrhœa, and the spasms of the extremities; in the Asiatic form it is so unlike, that it would require some ingenuity to say in what way it could be mistaken for dysentery. Yet in the fever consecutive to this form of cholera, we have known dysentery occur as a complication.

Hæmorrhoids, by giving rise to tenesmus and bloody discharge, may simulate dysentery; nay, the inflammation which sometimes accompanies them may by extension pass into dysentery; but when not so complicated, they are to be distinguished by the hæmorrhoidal tumours, the pure florid blood, the seromucous exudation, and the pain felt at the termination of the rectum during a stool.

Prognosis. We have already noticed the indications of severity afforded by the pathological extent of the disease, but other signs may be derived from the symptoms and their duration. When the stools, after having been mucous and bloody, become bilious and feculent, and the tormina and tenesmus abate, we may augur favourably of the issue of an acute attack, bearing in mind, however, that the disease, may pass from this state into chronic dysentery.

The following is a summary of the more striking *signa infausta.* A tumid, tense, and tender abdomen, the skin dry, harsh, unequally warm or moistened with cold perspiration, and of a lurid hue—the finger-nails sublivid, the position of the body supine, with the knees drawn up, the eyes sunk, cheeks collapsed, the mouth half open, the teeth covered with sordes, the tongue red and polished or looking chapped and raw; the prostration extreme, the ejections involuntary, and sanious or claret-coloured, with an odour *sui generis*—the urine scanty and copper-coloured; the pulse rapid, small and weak—muttering delirium, stupor and subsultus tendinum. We have known nearly all these symptoms present without any marked disturbance of the mental function, though it shared the general debility and exhaustion of the system. If no manifest improvement occurs in the local or febrile symptoms after the seventh day, the case may be viewed seriously; and if they continue unabated to the fourteenth or seventeenth, great danger is to be apprehended. The fever, whether typhoid or inflammatory, the subject, the nature of the cause, the character of the epidemic, and its tolerance of active remedies, will greatly influence the prognosis.

Causes. Dysentery spares neither age nor sex; but the persons most liable to it are such as have their vital powers depressed by fatigue, watching, anxiety, fear. The exciting causes may be such as act immediately on the alimentary canal; for example, acid unripe fruits, ill-made bread, lighted grain, drastic purgatives, putrid flesh. Of the effect of water polluted by animal matter in a state of decomposition, Dr. Copland speaks very decidedly in his copious and elaborate article, "Dysentery." He also declares that he has had repeated proofs that putrid exhalations may produce the disease. Exposure to cold and moisture, especially during the night in hot climates, is a powerful agent; hence the ravages of the disease amongst encamped armies. The contagiousness of dysentery, as of so many other diseases which prevail in an epidemic form, has been vehemently asserted and denied. The true doctrine appears to us to be, that although not essentially contagious, that is, although dysentery may run its course in one individual, without producing any secretion or exhalation capable of communicating the disease, yet in another, subjected to peculiar circumstances, there may be such a concurrent alteration of the fluids of the body, as will generate a contagious matter. This is particularly the case when the local inflam-

mation is complicated with typhoid fever; as may be witnessed in crowded prisons and camps, or among persons predisposed by their privations, habits, unwholesome dwellings, and accumulated effluvia, to this form of the disease. In some countries, in Egypt for instance, where it is endemic, and in Maryland, it may be traced to malaria. In the former it alternates with ophthalmia. In the Peninsula it was observed among our armies to assume a remittent type, or rather to be complicated with a remittent fever, an indirect evidence of its malarious origin. Dr. Copland observed a similar relation in Africa. The prevalence of the disease in tropical climates is well known; hot seasons, and particularly sultry days succeeded by cold damp nights, exert a remarkable agency in its production. Thus out of 13,900 dysenteric cases in Bengal, from 1820 to 1825, Mr. Annesley found that while 2400 only occurred in the cold season, there were 4500 in the hot and dry, and 7000 in the hot and humid season. In equatorial countries, dysentery is much more frequently connected with hepatic disease than in the temperate zone.

Treatment. In the simple forms of the disease the indications are obvious, and not difficult to accomplish; 1. to reduce the local inflammation; and, 2, to alleviate the more distressing symptoms.

1. Bloodletting, both by the lancet and by leeches must be practised, unless there are strong contra-indications in the habit of the individual. Though we have known it requisite to repeat venesection twice and thrice, one general bleeding for the most part is sufficient. Leeches are to be applied freely, in relays of from twenty to thirty, along the arch of the colon, or, with still more decided benefit, in smaller numbers around the margin of the anus. The warm fomentations and poultices applied to encourage the bleeding afford great relief. In very mild cases leeching only will suffice. Blisters may be employed when we have carried depletion as far as we think safe, but not before. Dr. O'Beirne, of Dublin, recommends with great earnestness fomentations of the abdomen with infusion of tobacco, made in the proportion of a quarter of a pound of leaf tobacco, to four or five quarts of water. Under their use the tormina abate, and the force of the circulation is reduced with less expenditure of the general strength than when bleeding only is employed.* The medicines which should be given internally, must be determined by the state of the bowels. If the attack began with feculent diarrhœa, it is useless and injurious to exhibit purgatives, though it was once the practice to employ active cathartics from the commencement, under the false impression that the irritation was caused by scybala, while, on the contrary, these accumulations in the cells of the colon are the mere effect of the irregular and spasmodic contraction of its fibres; on the subsidence of which, together with the inflammation, the scybala are propelled by the more equable and consentaneous action of all the portions of the gut. But if, from the beginning, there has been a deficiency of the natural excretion, or if some time has passed during the course of the disease without a feculent motion, it is desirable to administer a laxative. It must, however, be still borne in mind that depletion is itself one of the best aperient measures, by removing the cause on which the suppression of the natural secretions depends. Castor oil alone, or in the form of emulsion, may be given, and it is an excellent practice to add to it a few drops of laudanum, which will not interfere with its aperient effect. We can recommend with confidence a compound which we are in the habit of prescribing in many cases, which demand an accommodation of the laxative to the irritable condition of the gut, consisting of manna, sulphur, carbonate of soda, and tincture of henbane. It may be rendered more potent by adding infusion of senna. In some cases the Pulv. Jalap Comp. answers extremely well, operating fully, and with little distress. The time for adopting this part of the treatment often presents a difficult question, to be decided by the tact and experience of the practitioner. After free depletion in proportion to the strength, if twenty-four

* New Views of Defæcation, &c. Dr. O'Beirne, &c.

hours have elapsed without any decided admixture of feculent matter with the discharges, we have known a dose of calomel alone produce a very happy effect, bringing down a bilious stool, from which the subsequent amendment might be dated.

Dr. O'Beirne is anxious to induce his professional brethren to make trial of the introduction of his favourite tube into the sigmoid flexure of the colon, believing that much mischief ensues from the retention of fecal matter, and diseased secretions in the large bowel; and that this retention is mainly caused by a spasmodic closure of the upper annulus of the rectum. He relates three cases in which it seemed to be beneficial.

Opium is a most important remedy, either alone, or in conjunction with mercury. The latter combination is often administered with a view to maintain the natural secretions, at the same time that it moderates the irritation. It may be given in doses of one or two grains of calomel with half a grain or a grain of opium, or five grains of Dover's powder every three hours, or if the calomel appears too irritating, Hydrar. c. Cretâ may be substituted. In tropical climates, scruple doses of calomel have sometimes appeared to allay rather than to aggravate the irritation, and we have witnessed analogous effects in this country. This observation was once greatly abused in tropical practice, having tempted practitioners to the indiscriminate and empirical employment of the medicine as a specific. Perhaps the fact of the disease being not infrequently connected with hepatic affections and bilious fevers, had an equal influence in encouraging the practice. The sedative effect alluded to, is produced rather upon the stomach (checking sickness) than upon the colon, which, on the contrary, seems to be specifically irritated by this medicine. The weight of testimony is now decidedly in opposition to its employment in large doses. Nor does so much good seem to have resulted, as might *à priori* have been expected, from mercury given in small but repeated doses, sufficient to affect the mouth. Dr. Cheyne (*Dub. Hosp. Rep.* vol. iii.) found it useless in the epidemic dysentery which ravaged Ireland; and although he speaks favourably of calomel and opium, it is evident that he assigns the benefit chiefly to the latter medicine, which he thinks ought to be used in large doses. The coexistence of a scorbutic state of the system is a strong contra-indicant to mercury.

It is a great object to promote the action of the skin, for which purpose the warm bath may be used, conjointly with Dover's powder and saline diaphoretics. Ipecacuanha has been recommended strongly by Mr. Twining, for its somewhat specific effect in allaying irritation, and procuring natural secretions, in doses of 5 or 6 grs. combined with extract of gentian, night and morning. In cooperation with this remedy, Mr. Twining administered a drachm of Pulv. Jalap Comp. (Jalap Əi., Pot. Supert. Əij.) in the middle of the day. (*Clin. Illust. of the Dis. of Bengal*, vol. i. p. 69.) It is remarkable that the ipecacuanha, though in such large quantities, rarely produces sickness.

2. For the relief of the tormina and the tenesmus, opium is our great resource. Dover's powder, in full doses by the mouth, in some cases, has a very happy effect. If it causes sickness, we may administer crude opium in the form of pills. Sometimes the rectum will retain a small injection of arrow-root and laudanum; and when this is the case we cannot select a better mode of using the remedy. Opiate suppositories are also useful.

A solution of acetate of lead and laudanum is sometimes a good palliative of the tenesmus, and for moderating the sanguineous discharge, no medicine is, in our opinion, comparable to the acetate of lead. But it should not be administered before depletion has been freely employed; we have ventured, however, to give it earlier than we should have dared to use any other astringent, believing that it exerts a sedative action upon inflamed parts independently of its styptic property. It may be exhibited by the mouth, either in pills or in solution.

For restoring the natural condition of the mucous membrane, after the active inflammation has given way, we may employ lime-water, copaiba, nitric acid with light bitters, conjoining opium according to circumstances.

In cases attended with great prostration from the commencement, particularly in low typhoid fever, it may be necessary, not only to use depletion sparingly, but to administer wine and ammonia early in the attack. Dr. Copland speaks highly of oil of turpentine and castor oil as a purgative in what he designates the simple asthenic form. But the modifications of treatment required in the various forms under which dysentery appears, are endless. For those which belong more particularly to tropical climates, we refer to the works of the last-mentioned author, and also of Dr. James Johnson, Mr. Annesley, and Mr. Twining.

The principles of treatment appropriate to *chronic* dysentery, may be gathered from what has been said of chronic ileo-colitis. But we may remark, in addition, that Mr. Twining found ipecacuanha in large doses scarcely less useful in this than in the acute form. The chronic thickening and induration of the sigmoid flexure of the colon, sometimes left by chronic dysentery, requires a long and persevering use of local remedies, particularly leeching and repeated blistering.

The diet of dysenteric patients must be sparing and light, consisting of liquid or semi-liquid farinaceous substances, not only as a part of the antiphlogistic treatment, but to avoid any risk of topical irritation. In the chronic disease we may often allow wine, at the same time that we forbid any but the lightest aliments, such as arrow-root and milk.

The chronic form of dysentery is analogous, in many respects, to the acute; that is, the anatomical characters differ but slightly. The treatment, however, is very dissimilar; in the chronic form we rely almost exclusively upon rigorous attention to diet and to the use of alteratives in very minute doses. Opium and ipecacuanha may be given in small doses, and combined with a tenth or twentieth of a grain of calomel three or four times daily, provided the system has not been previously brought under the mercurial impression. The nitrate of silver is another excellent remedy, either administered by the mouth in the usual doses, gradually increased to five or six grains in the twenty-four hours, or in injection. When every thing else fails, a sea-voyage, or a change of climate, will often succeed. Chronic dysentery is not a disease to be treated in any uniform way; the prescriptions must be varied as soon as they lose their effect, just as we would do in the treatment of an external ulcer: cicatrization is a slow process, but it will generally be brought about unless the bowels be much contracted, when the distention of them by foul matter is almost sure to reproduce the disorder. On this account the extreme retraction of the abdomen, which is a conclusive proof of the contraction of the bowels, is a very unfavourable symptom.

Both in France and England dysentery is a disease of little moment, generally assuming a very mild type, and yielding readily to ordinary remedies. Hence, we always find that it is passed over with comparative neglect by physicians who have observed the disease only in those countries. In the United States the summer climate approaches more nearly to that of the tropics, and in many parts of the country dysentery is connected with the malarious fevers which are so prevalent during the autumnal months; but in general it does not prevail most extensively during the season of fevers, it rather precedes them, and occurs chiefly during the hot months, while the epidemics of fever occur towards their close.

We observe a great variety in the type and severity of the disorder: when it prevails as a sporadic disease it generally assumes more or less of an inflammatory character, but when it is decidedly epidemic it is very often attended with symptoms of prostration, and passes insensibly into the malignant variety; this is especially the case when the disease attacks men who are accumulated together in large numbers, and the dysentery is then highly infectious and very fatal. The anatomical characters differ nearly as much as the symptoms. In the acute inflammatory forms, the membrane is extremely red, thickened, covered with irregular

patches of lymph, and the ulceration of the follicles presents the intensely red elevated edges of high inflammatory action; but in the malignant varieties the membrane passes rapidly into sloughing; and even when positive sphacelus has not taken place, the mucous coat is of a dark livid tint, so that the morbid action is evidently more nearly connected with congestion than acute lymph-secreting inflammation; ulceration is then very rapid in its progress, and passes by insensible shades into gangrene.

The examination of the pathological states of these varieties naturally leads us to the study of the symptoms and treatment. In the inflammatory dysentery the symptoms are acute, and are generally attended with much fever and pain, especially if the inflammation extend over a large portion of the intestine; but in the adynamic form, the pulse becomes feeble and frequent, the skin dusky, sometimes cold, and the nervous symptoms, such as great prostration and tendency to stupor, are very prominent. The former is to a great degree a local, the latter a general disorder, which is evidently connected with an altered condition of the blood, and presents the nervous symptoms inseparably dependent upon it.

As to the treatment, we have, therefore, a very plain course in the inflammatory dysentery, but a difficult and doubtful one in the malignant variety. When the disease is active in its character, the patient will often bear blood-letting with great advantage; that is, provided the circulation sympathizes much with the disease; but, as a general rule, the abstraction of blood is neither so well borne, nor so necessary as in the inflammation of serous membranes. If there be much pain, cupping or leeching is always advisable: the cups should be applied over the most painful part of the abdomen, but the leeches are most serviceable near the anus, and almost always relieve the symptoms, and sometimes cut them short. Other local applications, as poultices of hops, or warm anodyne fomentations, are of decided benefit. There are several modes of treating the disease by internal remedies. If it be mild, a dose of an ounce of oil, and twenty-five or thirty drops of laudanum, is the familiar prescription, and will often cure the disease, especially if the effect of the remedy be kept up by small doses of oil with opium and an aromatic afterwards. Another plan, in more severe cases, is to give at once a dose of calomel, ten or twenty grains, with a grain and a half to two grains of opium, and follow it by oil. But I much prefer placing the patient, after one dose of oil and laudanum, upon the combination of calomel, opium, and ipecac.: a very good preparation is a grain of the latter medicine, and a quarter to a sixth of a grain of the two former every two hours: sometimes the proportion of opium must be larger. It is better, however, to give the additional quantity in enema if the rectum will retain it. The opium and ipecac. are both most useful relaxing and palliative remedies, but the cure depends mainly upon the calomel, and the symptoms generally cease as soon as a slight mercurial effect is evident, or a few hours previously. There is one matter, however, to be strictly attended to: when the calomel does do good, it becomes very evident, but when it produces little or no benefit, notwithstanding it has been pushed to ptyalism, no attempt should be made to continue its administration. The ulcerative process has, in such cases, usually commenced, and is rather favoured than retarded by calomel. The same rule, however, extends to most inflammatory disorders, especially those of the mucous membranes. Opiate enemata and external applications of opium are indispensable in many cases; anodyne enemata are chiefly necessary in those cases in which there is a continual bearing down of the lower part of the rectum and anus, without any real discharge.

The text contains the necessary directions for the employment of ipecacuanha, but there is another remedy of almost equal importance in many cases, that is, the acetate of lead. I prefer restricting its employment to those cases in which an abundant hemorrhage occurs, especially of light florid blood; it should be combined with opium, and sometimes pushed to a large extent. In some epidemics it may be given throughout the disease.

The more severe forms of dysentery, are those varieties which approach to the malignant form. In their treatment mercurials are often positively injurious, or at least useless; that is, if they are given in such doses as to produce a constitutional impression; but small doses of blue pill are often of great benefit when combined with oleaginous mixture, or, as in the prescription of Mr. Twining, with ipecacuanha. The opportunities for bloodletting are also few in number; attended as the disease is with extreme prostration, the patient may sink

very rapidly after abstractions of blood; on the whole, the best treatment seems to be a dose or two of oil, or an aromatic infusion of rhubarb; then ipecacuanha with small doses of opium, during the early periods of the disease, and as soon as sinking occurs we must rely mainly upon stimulating remedies, such as small portions of wine, and still better, brandy-toddy, with camphor and acetate of lead. About a grain of camphor and two of acetate of lead may be given every hour or two, with a quarter or a third of a grain of opium. My own experience is against the employment of large doses of opium in this form of dysentery; if they be insisted upon, the patient is thrown into a state of stupor, but the ulceration and sloughing continue and the result is at last pernicious. But if remedies which rather favour the secretion and discharge of the morbid matter be prescribed, such as oil, with minute portions of blue mass and the free use of ipecacuanha, the chances of recovery are much enhanced.

There are two sets of chemical remedies much employed in dysentery, but totally opposite to each other,—the acids and alkalies—the first are generally used in the form of Hope's nitro-muriatic acid mixture: but I have not found it superior to other remedies of an ana-logous kind: in some tropical climates, lemon juice has been used as an enema, it is said, with great benefit. As the discharges are highly alkaline, and as this condition of things extends itself more or less to the secretions of the whole alimentary canal, the application of the acids may be readily undersood; they are not, however, generally of service in the more acute and inflammatory varieties of the disorder. But the utility of alkalies, in many cases, not apparently differing from those in which acids are given with great advantage, is as yet one of the therapeutic mysteries: it is not, however, without analogy, for, on the same principle, we at times prescribe acids for the pyrosis of dyspepsia. In different epidemics, one or the other of these classes of remedies will be applicable to the majority of cases in their declining stage.

Finally, much of the success of treatment in the low forms of dysentery will be owing to attention to hygiene, especially to a free circulation of air, and the removal of all offensive discharges from the patient. The diet of course, should be of the mildest character, and in no case, even in convalescence from severe attacks, should a large quantity of animal broth be permitted; this is sometimes allowed, but in many instances it will immediately reproduce the disorder.

In the acute stages of dysentery the simplest and mildest diet answers best; a diet composed almost exclusively of demulcents and diluents will, indeed, cure most mild cases of the disorder; that is, the disease is disposed to terminate in recovery, and a diet of this kind favours this natural tendency. Arrow-root, sago, salep, and other demulcents of an analogous kind answer well. The combination known under the name of Castillon's powders, composed of an ounce each, of sago, salep, and gum tragacanth, with one drachm of prepared oyster-shells, answers extremely well. A drachm or two of this compound may be boiled in a pint of milk, or in a less quantity, and taken as the diet of the patient.   G.

INFLAMMATION OF THE CÆCUM

OCCURS as a concomitant, or a consequence of the diseases described under the heads of colitis, and ileo-colitis; but occasionally, though not very frequently, inflammation attacks the mucous lining of the cæcum, without extending either to the ileum or the colon. When this happens the affection may be referred to causes of a purely local nature. Of this kind are intestinal concretions, or the accumulation of matters which have been imperfectly or not at all digested; retained and hardened fæces, the irritation of worms, &c.

The symptoms are pain and tenderness confined to the right iliac region or proceeding from it, as from a centre, and diarrhœa; the stools con-sisting chiefly of thin ill-concocted feculent substance, with much mucus, and

occasionally of hard lumps covered with slimy matter. These may be accompanied by a dull aching sensation in the lumbar region.

The disease is not very serious if it is treated promptly. But if neglected, the inflammation may extend to the other coats of the cæcum, and thus assume a much more dangerous character.

Leeches and blisters applied to the right iliac fossa; castor oil, if there is reason to expect accumulations; lenitive electuary; large and repeated emollient enemata, are the most important items of the treatment. In administering the enemata it may be requisite to use a tube of sufficient length to enter the sigmoid flexure of the colon. In the chronic form of the disease, the balsam of copaiba, oil of turpentine, and compound tincture of benzoin, are useful medicines.

Inflammation of the serous covering of the cæcum will be treated of under PERITONITIS.

DIARRHŒA.

Varieties.—Symptoms and causes of each.—Treatment.

THIS affection, which is characterized by an increase in the number of the alvine evacuations, we have already noticed as a symptom of intestinal inflammation; but it may occur idiopathically, that is, it may be the primary and most important feature of an indisposition. Many varieties of diarrhœa are described in the works of systematic writers; but the following embrace all that are of any importance in practice:—1, Diarrhœa from increased peristaltic action; 2, diarrhœa from an increased quantity of feculent matter; 3, diarrhœa from morbid bilious secretion; 4, diarrhœa from increased mucous secretion; 5, diarrhœa from serous secretion; 6, diarrhœa from fibrinous secretion.

1. Many individuals have an irritable state of the bowels, independently of any morbid condition of the mucous membrane or of the intestinal secretion. In such cases, the intestines propel their contents hurriedly, apparently in consequence of the irritability of the muscular fibres. We have noticed this affection chiefly in nervous females, and the exciting cause is generally some moral excitement. It appears to us to bear a considerable analogy to nervous palpitation, and nervous irritability of the bladder. The stools, as might be expected in such cases, are often small though frequent. It does not correspond exactly, though it has some resemblance to the lienteria, or *lubricitas intestinorum* of the ancients; for it is not necessary that the stools should consist of the undigested matters which characterize the lienteric diarrhœa, and which imply a faulty action in the stomach, the crudities in this case acting as irritants. But when diarrhœa from mere irritability of the fibres sets in, the intestines get rid of whatever matters they happen to contain; and from the feculent character of the stools, there is reason to believe that the colon is the part chiefly affected. This form of diarrhœa is often accompanied with enormous flatulent discharges.

2. The second form corresponds with the *diarrhœa crapulosa* of Dr. Cullen, the *diarrhœa fusa* of Dr. Good, and the *feculent diarrhœa* of Drs. Crampton and Forbes; and depends upon an overloaded condition of the bowels, occasioned by excess in the quantity of aliment, or by the quality being such as to produce an excessive collection of excrement. Fruits and many other vegetable substances, containing but a small proportion of matter capable of assimilation, have this effect.

3. In the *bilious diarrhœa* the evacuations are frequent, fluid, and of a bright yellow or greenish colour. The pathological cause of the increased secretory action of the liver is not clearly understood; it may sometimes be referred to

sympathy with the duodenum, but in other cases the liver itself appears to be more directly acted upon. Thus it is common among Europeans in tropical climates, who are also particularly liable to hepatic disease: in this country, it prevails most in summer and autumn.

4. *Mucous diarrhœa* is a very common form, and might be called catarrh of the bowels. It may, as we have seen, be symptomatic of enteritis, or it may arise from irritation of the follicles, produced by substances directly applied to them, as fruits and drastic purgatives; or from congestion of the mucous membrane, occasioned by exposure to cold or by wet feet: in the latter case, it sometimes alternates with catarrh of the air-passages, and may readily pass into enteritis. This form of diarrhœa may be produced by the peculiar state of the atmosphere, especially cold and damp; sometimes it can be traced to miasmata, as from drains, open cesspools, &c.; and sometimes to impure water, bad grain, or in fact to unwholesome food of any kind. The stools do not at first present a mucous character; they are thin and acrid, like the nasal coryza, and the pituitous sputa of catarrh; but as the disorder declines, the true mucus appears mixed with the feculent matter. When nothing but mucus is discharged, the irritation is violent.

5. *Serous diarrhœa* can scarcely be distinguished by the nature of the stools from the first stage of the last variety. It may be inferred to be rather an exhalation from the mucous surface than a morbid follicular secretion, when it alternates with a profuse perspiration, as in colliquative diarrhœa, when it is vicarious of dropsy in the serous or cellular membranes, and when the blood has a very large proportion of serum. The most intense degree of it is seen in Asiatic cholera.

6. *Fibrinous diarrhœa.* The mucous membrane of the bowels occasionally secretes coagulable lymph in considerable quantity, and of sufficient consistence to be discharged in the form of hollow cylinders, moulding the interior of the intestine. Hence the affection was designated by Dr. Good *diarrhœa tubularis.* The fibrinous discharges bear a close resemblance to the false membranes of croup, and the tunica decidua of the uterus. They are not always in a tubular form; thus we have observed them in amorphous masses, semi-organized, and looking like portions of detached, cellular, or serous membrane. In this state they may be easily overlooked, or even mistaken for lumps of concrete mucus or imperfectly-digested food. It is to be regretted that the precise condition of the mucous membrane, on which the exudation of the lymph depends, has not been ascertained by morbid anatomy. It is by no means a fatal, though generally a tedious affection. We have met with it in the course of chronic complaints, which were characterized by irregular action of the bowels, dyspeptic symptoms, and anomalous disorders of the nervous system: it is rarely attended with indications of an inflammatory condition of the canal. In the cases which have fallen under our own observation, the discharges have been preceded by long-continued uneasiness in the abdomen, and followed by feelings of great relief.

In the present state of our knowledge, it is impossible to say whether the secretion is confined to particular tracts of the canal, or whether some parts are more liable to it than others. Judging from the calibres of the fistulous exudations, they may come from the small as well as the large intestines; and the symptoms of jaundice, with pain in the epigastrium, noticed in certain cases, lead to the belief that the disease may have an origin as high as the duodenum. We consider these cases to be intimately allied to others, in which patients, after suffering great local distress in the region of the duodenum, are relieved by what they suppose to be the breaking of an abscess in the liver, and which consists in the discharge of puriform mucus. Dr. Todd adverts to instances of this nature in his remarks upon " follicular duodenal dyspepsia." (*Cyc. Prac. Med.*, art. INDIGESTION.)

It is probable that the follicles are the principal seat of the disease, for we

know that they sometimes secrete a dense tenacious mucus, differing little in its physical qualities from coagulated albumen, or even fibrin; and the researches of modern chemistry go far towards showing, not only the close connexions, if not identity, between fibrin and albumen, but also that the formation of mucus requires little more than the addition of saline matter to albumen in a state of minute subdivision; and conversely, that the withholding of the saline particles may cause a secretion of albumen instead of mucus.[*]

Treatment. The *first* variety generally subsides spontaneously. The best medicine, should any be required, is a sedative, or a combination of anodyne and antispasmodic substances; as, for instance, a few drops of laudanum in aromatic water, or a pill of camphor, and extract of poppy. The principal object of treatment is to subdue or diminish the morbid irritability by a tonic regimen, and thus to prevent the seizures.

2. The *diarrhœa crapulosa* requires a mild but efficient laxative, as castor oil, or a draught containing Magn. Sulph., Pulv. Rhei, Confect. Aromatica, and water. If looseness continues after we have reason to think that all accumulations have been removed, a moderate opiate will generally put an end to the complaint.

3. The practice usually recommended for the *bilious* form is to administer demulcents, as barley water, linseed tea, and alterative doses of mercury, particularly the Hydr. c. Cret. with rhubarb. But it often happens that the irritation is so great as to compel us to give an opiate at once in combination with Mist. Cret. and Vin. Ipecac. After the irritation has been quieted, the alterative medicines will be very appropriate.

4. The indications of treatment in *mucous diarrhœa* are first to divert the morbid congestion, and to allay irritation; and afterwards to diminish the morbid secretion. Counter-irritation by sinapisms on the abdominal parietes, the pediluvium, the warm bath, diaphoretic medicines, such as Acet. of Ammon. with Ipecac., and Sp. Æth. Nitr., will fulfil the first indication. If there be much pain or feverishness, local or even general bleeding may be required. The medicines proper for allaying irritation have been already alluded to.

For arresting the mucous flux, the vegetable astringents are usually sufficient; particularly logwood, catechu, and kino. Infus. Gallar. is much relied upon by some practitioners. The compound tincture of benzoin, copaiba, or oil of turpentine, may be employed in some cases with advantage. Limewater, and arrow-root or starch injections, with laudanum, are also valuable resources.[†]

5. The *serous diarrhœa* will often yield to opiates and vegetable astringents; but in many cases we are obliged to use the metallic salts. Of these, the most powerful by far are the acetate of lead and sulphate of copper.

6. The treatment of *fibrinous diarrhœa* requires a long course of alteratives. The milder preparations of mercury, such as Plummer's pill or Hydr. c. Cretâ, will be preferable when there is irritability of the bowels; but when there is reason to believe that the patient is not completely rid of the morbid secretions already formed, it may be needful to administer two or three grains of calomel. Turpentine, copaiba, benzoin, and tar-water, are useful medicines in this disease. Many cases require the use of tonic remedies, the most eligible of which are lime-water, the preparations of steel combined with neutral salts, the mineral chalybeates, and nitric acid exhibited in a bitter infusion. The use of the warm salt-water bath is a valuable auxiliary to the treatment.

The diet in every variety of diarrhœa, as in all other enteric disorders, must be rigidly watched. Few errors are more frequently committed by patients, and sanctioned by their friends, than that of cramming, in order to make up for

[*] See a paper by Dr. G. Bird on the "Chemical Nature of Mucous and Purulent Secretions," in *Guy's Hosp. Rep.*

[†] The following is a good prescription: R. Opii, gr. ¼ vel gr. ss., Rhei, gr. ss., Ext. Krameriæ, gr. ij. mft. pil. One of these every two or four hours.   G.

the frequency of the evacuations. The food should be at first in a liquid form, as barley water, thin gruel, chicken broth; afterwards light puddings, made of arrow-root, rice, sago, and tapioca, may be allowed. Vegetables, fruits, and other substances, which cause the formation of a large quantity of feculent matter, are to be proscribed. In many acute cases it is better to take nothing but toast-water for several hours.

CHOLERA.

Sporadic cholera.—Symptoms.—Causes and Treatment.—Malignant or Asiatic cholera.—History.—Causes.—Symptoms. — Prognosis. — Anatomical characters.—Nature. — Treatment.

THERE seems to be some doubt respecting the etymology of the word cholera. This name was given by the early Greek physicians to a disease, which, from being of frequent occurrence, at particular seasons, in most European countries, from presenting symptoms, often of an alarming, and always of a striking kind —and from occasionally proving speedily fatal, has in all ages attracted the attention of medical writers. In modern times, the same term has been applied to a disease, which resembles the former in some of its most striking symptoms, and which, having shown itself first in the continent of India, and exhibited a virulence, a capability of diffusion, and an independence on climate, unexampled in the cholera of former times, has, during the present century, spread as a pestilence over a considerable part of Asia, Europe, and the northern part of the western world. We shall consequently consider cholera under two heads :—1. Common, or sporadic cholera, the disease known to the ancients ; and 2. That which has lately excited so much alarm, and which has been distinguished by the epithet epidemic, or malignant, or Asiatic.

Common or Spasmodic Cholera.

This disease seems to have occurred in all ages. It is several times mentioned by Hippocrates, who relates (*Hippocrates, De Morbis Popularibus*, lib. v.) the case of a man affected with it, and enters into details respecting its history and symptoms, its supposed causes, and the treatment he adopted. Aretæus (*Aretæus*, lib. ii. cap. 5.) has left us an admirable account of the symptoms of the disease, with which he seems to have been very familiar. It is also treated of by Celsus, (*Celsus*, lib. iv. cap. 2.) who delineates its most striking features, and notices its occasionally speedy and fatal issue.

Among modern authors may be cited Sydenham, whose chapter on cholera in 1669, in the autumn of which year it was remarkably frequent, affords evidence of the powers of observation of that distinguished physician. Since his time, the subject has often appeared in the medical literature of this and other countries. All authors describe the disease as being most frequent towards the end of summer or in autumn, and the cases as occurring sporadically ; although in some seasons, as in this country in 1669 (see *Sydenham*) and 1676, it has been unusually prevalent over an extensive district.

The earliest *symptoms* of sporadic cholera are vomiting and purging, which recur at short intervals. The evacuations are expelled with force, yet without apparent effort, and, after the ordinary contents of the stomach and intestines have passed off, are liquid, variously tinged with bile, and excessive in quantity. The patient suffers from pain in the abdomen, and often from painful and quickly

recurring cramps in the muscles of the legs, abdomen, and occasionally of the arms : at the end of some hours, the pulse becomes small and frequent, the voice weak, the countenance either pale or of a reddish hue, the features shrunk, the eyes hollow and surrounded by a dark areola, the surface of the body, and particularly the extremities, cold ; the patient is parched with thirst, and continually calling for drink, which immediately brings on vomiting ; the discharges, especially those from the intestines, continue, and the urine is almost suppressed.

A favourable termination is indicated by cessation of the discharges and cramps, and by increase in the strength and diminution in the frequency of the pulse. But sometimes the disease progresses, the temperature of the surface sinks still lower, the pulse becomes almost imperceptible, and the patient experiences vertigo, and a tendency to fainting. The discharges at length cease, or the evacuations become scanty ; but hiccup supervenes, with frequent retchings and ineffectual efforts to go to stool, the body becomes bedewed with a clammy moisture, and the patient expires, his mental faculties remaining unimpaired to the last.

This termination, however, contrary to what happens in malignant cholera, seldom takes place in less than three or four days, though it may occur much earlier, and is rare, except in old or debilitated subjects.

In cases of recovery, the convalescence is generally rapid ; but in some instances, after the violent symptoms have ceased, the patient continues feeble ; his appetite does not return ; he has frequent nausea, and occasional vomiting of bilious matter, particularly in the morning ; a dry or furred tongue ; a sense of uneasiness at the epigastrium, with some degree of tenderness on pressure ; and an irregular action of the bowels, attended with colic and copious discharges of dark, vitiated bile—symptoms indicative of gastric and intestinal irritation, which, under appropriate treatment gradually subsides.

As sporadic cholera rarely occurs, except in autumn, and does not often prove fatal, opportunities of examining the state of the organs after death are not frequent, and the morbid anatomy of the disease has not been sufficiently studied. Since the appearance of malignant cholera, which, in many of its symptoms, offers a striking resemblance to the disease of which we are now speaking, a new interest attaches to the latter, from its bearing on the important question of the specific nature of the former. It would be especially interesting to ascertain whether the intestinal glands or follicles, which are almost constantly enlarged in malignant or Asiatic cholera, are similarly affected in sporadic.

Causes. The chief predisposing cause is season. We have already stated that the disease is most frequently met with in autumn. Sydenham says, that it occurs with the same regularity in August, as swallows in spring, or the cuckoo at the commencement of summer ; and placed so much reliance on this circumstance, as to believe that a disease occurring at any other season, though resembling autumnal cholera in symptoms, is in its nature essentially different. He ascribed the production of cholera to some atmospheric influence peculiar to that season.* It has been observed to be most common in adult age. Among the occasional exciting causes may be mentioned, spoiled or unwholesome provisions ; the action of an emetic, or drastic purgative ; iced or cold drinks, when the body is heated ; or an abrupt transition from a high to a low temperature.

Treatment. Opium was first recommended by Sydenham, and subsequent experience has justified him in calling it the sheet-anchor of the physician, in the treatment of this disease. A considerable dose of it should be given at once, and be repeated at the end of two or three hours. If this fail in putting a stop to the symptoms, we may give it in conjunction with calomel, one grain of the former, with eight or ten of the latter ; which may be repeated, if necessary, after some hours. Diluent drinks should be allowed, *in small quantities,* with

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* Sporadic cholera does not occur exclusively in autumn, as Sydenham imagined ; but it is certainly much more frequent during that season than at any other time of year.

the view to allay thirst without exciting vomiting. The heat of the surface
should be maintained by friction : by the application of bags of hot bran, salt,
or sawdust : but especially by the hot-air bath. We would warn our readers
against the danger of applying jars of *hot* water to the feet, in cases in which
these are very cold. We have recently seen a case in which such application,
though scarcely noticed by the patient at the time, and producing no immediate
effect on the parts, was followed on the occurrence of reaction, by extensive
vesication and mortification of the feet. This is analogous to what happens
when the same treatment is adopted in cases of frost-bite. If the collapse be
considerable, we may have recourse to diffusable stimuli, such as brandy,
camphor, and ammonia. The diligent application of these means during the
urgency of the symptoms, will rarely fail of success. After the subsidence of
the violent symptoms, the strength of the patient should be recruited by a mild,
nutritious diet ; every thing likely to bring on a recurrence of the symptoms
should be avoided ; and constipation, if present, which frequently happens in
these cases, should be removed by the use of emollient enemas. If symptoms
of gastric irritation remain, we should prescribe leeches to the epigastrium ;
soda water, or effervescing draughts, in small quantities ; and a diet of the
mildest kind.

Malignant or Asiatic Cholera.

There is reason to believe that this pestilence existed in India, showing itself,
however, only occasionally, and in districts of limited extent, for a long time
before it became diffused over Asia and Europe. Dr. Paisley mentions it as
being at Madras in 1774. (See *Curtis's Diseases of India*.) In 1780 it is
said to have destroyed at Hurdwar, during a festival which is annually held
there, 20,000 persons ; and, in 1781, to have assailed, in its most malignant
form, a division of Bengal troops, then stationed at Ganjam. An admirable
account of the disease, which leaves no doubt of its identity with that since pre-
valent, was given by Mr. Curtis, who described it as spreading, in the year
1782, in Sir E. Hughes's squadron, then stationed in the East ; and as having
arisen from communication with an infected port in Ceylon. In the *Madras
Reports*, it is stated to have raged at Arcot in 1787.

It appears from a communication made by Mr. Barnes, the medical super-
intendant at Jessore since the year 1810, to Dr. Roupell (see *Roupell on Cho-
lera*, p. 16) that twice previously to 1817, the disease had prevailed there to a
great extent. In the months of May and June of the latter year, it showed
itself in various parts of the southern districts of Bengal, and, in the month of
August, suddenly broke out at Jessore, a populous town in the centre of the
Delta of the Ganges, where, from its inexplicable and fatal effects, it occasioned
the greatest consternation : six thousand persons are reported to have died of it
in the course of a few weeks.

From this point, as its origin,* it spread rapidly, in every direction, over the
provinces of Bengal, and, by the beginning of September, had reached Calcutta.
It then followed, principally, the course of the Ganges and its tributaries, ap-
pearing successively at towns more and more remote from its mouth ; and, in
the beginning of November, attacked, with great virulence, the English army
then assembled on the banks of the Sinde, one of the tributaries of the Jumna,
in the most central part of India. In 1818, it still advanced, and, in the month
of August of that year, reached the western coast of India, having traversed
the Ghauts. But, while the disease was continuing its march from east to west
across the peninsula of India, it proceeded, in the spring of 1818, from north to

* The following sketch of the progress of the disease has been derived principally from the
facts detailed in the work of Moreau de Jonnés.

south along the coast of Coromandel, and, in the month of October of that year, appeared in the city of Madras, and had spread over that presidency; so that, by the end of 1818, it had become diffused over all the continent of India.   In the beginning of 1819 it invaded the island of Ceylon; and in the month of November of the same year made its appearance in the Mauritius, where it proved very destructive.

While the disease was thus becoming disseminated throughout the peninsula of India, it extended itself, at first much more slowly, along the eastern coast of the Bay of Bengal.   In 1819 it penetrated into the kingdom of Arracan, whence it passed into the kingdom of Siam, the peninsula of Malacca, and the island of Sumatra.   In 1820 it appeared at Canton, in Borneo, and at Manilla, in the Phillippine Islands.   In 1823, we find it committing its accustomed ravages in the Molucca or Spice Islands, and in the Chinese cities of Nankin and Pekin.   It subsequently penetrated into Chinese Tartary, and the high latitudes of Eastern Asia.

The disease did not advance westward of the peninsula of India till 1821.   It had reigned in a vast extent of the presidency of Bombay, from the month of March of that year.   In the month of June it appeared at Muscat, and, almost at the same time, in the islands at the entrance of the Persian Gulf, and at Bender Abouchir, the principal mart of Persia for the commerce of British India.   It then proceeded along the Arabian shore of the Persian Gulf, and reached Bussorah in the month of August; from Bussorah it spread in the autumn of the same year through Mesopotamia, appeared at Bagdad, and extended as far as the desert which separates Mesopotamia from Syria.   It did not overcome this obstacle, but apparently yielding to the influence of cold, disappeared until the spring of 1822, when again it showed itself between the Tigris and Euphrates, again advanced towards Syria, and broke out at Aleppo in the beginning of November.   It again subsided during the winter.   In the spring of 1823 it revived, invaded, during the summer, the Syrian towns along the borders of the Mediterranean, and unexpectedly ceased to advance without reaching Egpyt.   At the time that the disease was proceeding along the coast of Arabia it penetrated, in the summer of 1821, into the interior of Persia, and by the end of autumn had reached Ispaham, the capital of the Persian empire.   Its progress here, also, was arrested at the approach of winter.   In the spring of 1822 it again developed itself in the centre of Persia, and advanced slowly through the northern provinces of that empire.   In 1823 it reached the shores of the Caspian, and, in the month of September of that year, appeared at the populous and commercial town of Astrachan, at the mouth of the Wolga.

The disease made no farther advances towards Europe until 1828, in the autumn of which year it broke out at Orenburgh, a town situated at the limit of European Russia, and the mart of commerce with the regions of Upper Asia.   It subsided during the cold season, but reappeared in 1829, and extended its limits.

In 1830, it showed itself on the borders of the Black Sea and of the Caspian, and rapidly advanced into the centre of European Russia, reaching Moscow in the month of September.   It prevailed in Moscow *throughout the winter*.   In 1831, it continued to spread over the provinces of European Russia, appearing at *Archangel* and St. Petersburgh, and became diffused over Poland, Prussia, and Germany.   While it was thus traversing the continent of Europe, it appeared in May, 1831, in Mecca, where it proved very fatal to the pilgrims; and, in the month of August, it broke out in Alexandria, and nearly at the same time in all the towns and vilages of the Delta of the Nile.   In the month of October of that year, it first showed itself in this country, at Sunderland, whence it advanced slowly towards the north, reaching Edinburgh, in the month of January, 1832.   In the following month it broke out in London, and soon after in many other towns of England.   During the same summer, we find it prevailing in Holland, France, and the Peninsula.   In the early part of June, some

cases occurred at Quebec, and the disease became rapidly disseminated through-out the provinces of upper and Lower Canada, and the United States. Cholera raged at New Orleans a year or two before it appeared in Sweden, and four years before it devastated Sicily and Naples. In this progress from east to west, from the centre of Asia to the shores of America, it advanced with variable rapidity. In less than a year it crossed the peninsula of India. From 1821 to 1823, it proceeded more slowly, through Mesopotamia and Syria on one side, and Persia on the other, from the shores of the Persian Gulf to those of the Mediterranean and Caspian Seas. In 1831, it spread from the centre of the Russian Empire, through Poland, Prussia, Germany, to the eastern coast of this country. Its principal advances have been made in the summer, and it has entirely subsided or remained almost stationary during the months of winter. It has continued in the same place from one to several months, generally longer when it appeared in spring or summer than when it showed itself at the approach of winter. In this gradual diffusion over the civilized world, it has overcome obstacles that have hitherto been sufficient to stop the progress of the plague,—it has traversed the Ghauts and the Caucasus; the sandy deserts of Arabia and Persia; the Indian and Atlantic Oceans. It has existed under the most various conditions of elevation and soil, temperature, and moisture;—at the level of the sea, and in the region of Napaul, at a height of not less than 5,000 feet above it; on the borders of the ocean and in the centre of continents; during the summer heats of the torrid zone, and the rigours of a Russian winter; on the arid soils of Arabia and Persia, as well as in the marshy deltas of the Ganges and the Nile. It has made its way against the winds in Europe, and the mon-soons in the Indian Ocean. It has desolated small villages and populous towns —the thinly inhabited provinces of the Russian Empire, as well as the densely peopled district of Bengal. It has spared neither sex nor age. It has attacked the same individual twice or more, and persons affected with various diseases as well as those in robust health.* It has numbered among its victims persons of all classes, and almost of every nation. But, although it has existed under such a variety of circumstances, and every where with characters absolutely identical, the disease has spread most rapidly and extensively in the low, dirty, and crowded parts of large and populous towns.

In the sketch we have just given we have confined ourselves to the advance of the disease, to its continued invasion of fresh territory, and have not stopped to notice its recurrence in places it had previously visited. It has reigned in the immense territory of India, from its appearance in 1817 to the present time,—as if the country that gave it birth were the most congenial to its existence—ravaging in succession its different parts, almost always subsiding at the approach of the cold season to reappear with the first heats. There is scarcely a year during this period in which it has not shown itself in Calcutta, Madras, and Bombay. In Persia and Syria, it made several irruptions from 1821 to 1830. To the nations of Europe its visits have not been renewed with such frequency. In this country, it appeared in 1832; again, but in a more limited degree, in 1833 and 1834, since which we have been exempt from its attacks, if we except a feeble manifestation in the autumn of last year, when it occurred in a very isolated manner on the Thames.

There is one gratifying circumstance in the history of these subsequent irrup-tions; namely, that in them the disease has in general prevailed less extensively, and for a shorter time, than at its first invasion.†

The mortality occasioned by cholera has probably been greater than that caused by any epidemic disease that has existed for several centuries. In Jes-sore, at the time of its outbreak, in 1817, 10,000 persons died in the first two

* See Med. Chir. Trans. for 1838.
† An exception to this occurred at Berlin, where fewer persons were attacked, and with a lower rate of mortality, in the epidemic of 1831, than in that of 1837. The latter epidemic was, however, of shorter duration.

months. The mortality was scarcely less in some other towns of India, and it has been computed that in that peninsula, from 1817 to 1830 inclusive, the number of deaths from cholera amounted to 18 millions, in a population of somewhat more than 40 millions. We have only extremely vague and scanty data respecting the ravages of the disease in the countries of Asia not subject to European dominion, but there is reason to believe that in some of these* they were still greater than in India. In some of the towns of Arabia and Persia the mortality is said to have amounted to one-third of the population.

In Russia, in 1831, one-twelfth of the population of the infected provinces is supposed to have been attacked, and the mortality to have exceeded 60,000 persons. In Paris, during the epidemic of 1832, more than 18,000 fatal cases are said to have occurred. In this country, the ravages of the disease have been much more limited. In 1832, probably 5,000 persons perished from this cause in the metropolis, and the number of deaths reported in Great Britain was somewhat more than 20,000.

Causes. The circumstances most favourable to the opinion that malignant cholera is a contagious disease, are the following—its continued extension, in all directions, from the place in which it originated, with a rapidity, not uniform, and never greater than that of human intercourse—its having in many instances, appeared to follow the principal lines, in which this intercourse takes place—and its having frequently shown itself in a port or town, soon after the arrival there of a vessel or caravan from one previously infected.

The foregoing reasons, although we are quite ready to admit that they have considerable force, are far from being decisive of the question. Any influence, any combination, for example, of atmospheric circumstances, might, and probably would, be progressive. Influenza, which no one, we believe, supposes to be contagious, and which on more than one occasion has almost rivalled cholera in extent of diffusion, was also progressive, although its progress was much more rapid than that of the latter disease.

With respect to the circumstance, that cholera has appeared to follow the lines of human intercourse, it may be asked, did not this result from its having attracted more notice on these lines, from their being more open to observation, and from the fact that they generally connect large and populous towns, where the disease has made the greatest havoc, and where for various reasons, its effects have been most observed?

Granting the fact of its progression, the extensive relations and increasing activity of modern commerce must render the coincidence of its appearance in a port soon after the arrival there of a vessel from one previously infected, a circumstance of frequent occurrence.

Having said thus much against the conclusive nature of the arguments for contagion, we proceed to offer the reasons which have convinced us that the disease is not propagated in this manner. 1. The medical men and attendants on the sick have not generally been attacked in undue proportion; now as these persons are exposed in a degree incomparably greater than those who never approach the sick, they could not fail, if contagion existed, of suffering in a corresponding proportion. We have said that they did not generally suffer. Such was the case in India and in this country; and very striking instances of their exemption may be adduced. When the disease appeared in London in 1832, H. M. S. *Dovor* was fitted up as a cholera hospital for seamen, and stationed in the river, where the disease was most prevalent: more than two hundred

* "In 1820, the kingdom of Siam lost 20,000 persons, in the single town of Bancock, its capital.

"It destroyed, in 1822, in the island of Java, 102,000 persons, of whom 17,000 belonged to the town of Batavia.

"At Pekin, the capital of China, in the irruption of 1822 and 1823, the number of deaths exhausted all the means of sepulture; and a provision for this purpose was in consequence necessary from the imperial treasury." (*Moreau de Jonnés.*)

sailors,* affected with it, were admitted there: three nurses and one of the medical men lived on board; the other medical men, four in number, were in daily attendance; yet of these persons, medical men and nurses, not one was attacked, although the former were engaged, almost daily, in examining the bodies of those who died of the disease, and that in the lowest part of the ship, in an ill-ventilated cabin, in which all the dead bodies were placed. When the disease again showed itself in the metropolis, in 1834, the medical men and nurses of the hospital-ship *Echo*, which was appropriated to the same purpose, enjoyed a like immunity: and in fact, from the first appearance of malignant cholera in this country to the present time, not one of the medical attendants of the Dreadnought, the hospital for seamen in the port of London, or of the cholera hospitals connected with it, have taken the disease.

A striking example of the same kind, noticed in Edinburgh, is given by the late Dr. Mackintosh: he says, "In the Drummond Street cholera hospital" (of which he was physician) "there were 280 bodies examined. Two and sometimes three hours were spent in examining each body. The room where these examinations were conducted was a miserable place, eight feet square; generally six or eight persons were present, sometimes more; and, in an inner apartment, about ten feet square, there generally lay six dead bodies. Not one of those who frequented this den of death, and who had their hands imbrued in the secretions of the dead for six hours out of the twenty-four, were affected with cholera, although their hands were irritated and punctured daily." (*Practice of Physic*, p. 345.) A great number of instances of a like kind might be adduced, but the argument does not rest on particular examples, but on the fact that the attendants on the sick were not *generally* attacked in undue proportion, regard being had to the circumstances in which they were placed. Where cholera prevailed as it most commonly did, in particular parts of a town, the medical men who attended the sick in these infected parts were of course exposed to those local influences which were the cause of cholera in their inhabitants, and suffered therefore in a greater proportion than the entire population.

The example of greatest mortality among medical men and nurses occurred during the prevalence of the disease at St. Petersburgh; but it appears, from the report of Drs. Russel and Barry, "that in some cholera hospitals, favourably situated with respect to site, ventilation, and space, very few of the attendants suffered."

"In the hospital of the Semanosfsky guards, not far from the barracks, out of forty attendants on cholera patients, six were attacked, and two died, between the mornings of the 11th and 13th." "In the military general hospital, into which upwards of 400 cholera patients had been admitted from distant quarters up to the morning of the 13th, only one attendant had been attacked."

2. The disease has not been disseminated, as contagious diseases usually are under circumstances of free intercourse; in this country it did not spread into the agricultural districts, but was confined to towns, and generally to particular parts of towns. In the spring of 1832, we witnessed the epidemic of cholera at Ely, which is built on a hill rising out of the fenny district of Cambridgeshire: the disease was confined to the low and dirty streets at the foot of the hill; no cases occurred in the high and clean parts of the town: and during the summer of the same year we observed the epidemic at Plymouth, where cholera prevailed to a great extent; there also the parts of the town inhabited by the wealthier classes were almost exempt from the disease; and although continual intercourse with the country people was kept up, it did not spread to the rural

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* In another part of this article we have mentioned 160 as the number of cholera patients admitted into the Dovor. This was the number received after the 20th of May, when the Dovor came under the management of the Dreadnought committee. Before this time the Dovor was under the government charge.

villages adjacent. The history of cholera abounds in instances of the same kind : we shall only mention one more, which is given by Dr. Albers, in his report of cholera at Moscow. He says, " During the epidemic, it is certain that about 40,000 inhabitants quitted Moscow, of whom a large proportion never performed quarantine ; notwithstanding this fact, no case is on record of cholera having been transferred from Moscow to other places ; and it is equally certain, that in no situation appropriated for quarantine has any case of cholera occurred."

But here, as in the former case, the argument is not grounded on particular instances, however striking, but on the fact, that the disease has not been disseminated *generally*, in the manner of contagious diseases.

3. Another argument against the contagious nature of malignant cholera, is, that quarantine regulations have totally failed to prevent its advance. There are many instances of its having broken out in a place after the enforcement of the strictest quarantine for fourteen or twenty-one days, or even longer ; so that the opinion that it is contagious can be maintained only by the supposition, that it has occasionally a long period of incubation ; a supposition which is opposed by the fact, that, in cases where the time intervening between first exposure to infection and the developement of the disease has been most accurately marked, the period of incubation has ranged from one to five days.

" The subsidiary force under Colonel Adams, which arrived, in perfect health, in the neighbourhood of a village in India infected with cholera, had seventy cases of the disease the night of its arrival, and twenty deaths the next day." (*Bengal Report*, pp. 22, 23.)

" H. M. 54th regiment landed at Madras on the 10th of May, in a remarkably healthy state, after a voyage of forty-eight days, from the Cape of Good Hope, and marched into quarters at Fort St. George. Cholera appeared among the men within three days after their landing." (*Madras Report*, p. 23.)

4. But the strongest argument against the opinion that cholera admits a long period of incubation, or that it is contagious, is afforded by the shortness of the duration of certain epidemics. In 1834 the duration of the epidemic in London was less than six weeks ; and, in many instances, the disease has ceased in a town within a month, or even three weeks, after its first appearance there. Instances of this kind could scarcely happen if it were contagious, or admitted a long period of incubation. But it is not only in particular towns and districts of small extent that the prevalence of this disease has been of short continuance. Throughout England and great part of Europe and America, it ceased entirely, and of itself, within two years of its first appearing in these countries. A parallel instance cannot, we believe, be found in the history of any other disease, capable of being communicated by contagion, and we consider this circumstance alone almost decisive that malignant cholera is not propagated in this manner.

Most of the arguments against contagion, here advanced, were illustrated by the partial epidemic of malignant cholera in London, in the autumn of 1837. During the summer of that year it had raged in Italy, and gradually advanced towards us, appearing in succession at Naples, Rome, Berlin. On the 8th of October a patient in the seaman's hospital, Dreadnought, was seized with cholera, and between that time and the 28th twenty cases occurred there, of which twelve proved fatal. None of the nurses or medical officers of the Dreadnought were attacked, although the latter lived on board, were in constant attendance on these patients, and, in all the fatal cases, spent a considerable time in examining their bodies, in a small cabin appropriated to their reception. The persons attacked with cholera were admitted into the Dreadnought for other complaints : not a case occurred in any other vessel in the Thames ; and although, during the prevalence of the disease, patients were discharged almost daily from the Dreadnought, who immediately entered other vessels, they did not, in a single instance, communicate cholera to their crews. The person in

whom the disease first showed itself, left Dantzic for this country on the 8th of September; no case of cholera occurred in the vessel in which he sailed; so that the disease, if introduced by him, must have had a period of incubation of at least thirty days, a circumstance extremely improbable, if we consider that the second and third cases occurred within forty-eight hours of the first; that five patients, seized on the 21st and 22d of October, had come from the four quarters of the globe, and consequently could not have brought the disease, and, at the time of their attack, had been in the hospital from two to seven days only; and that the whole duration of the epidemic was only nineteen days. This last circumstance we conceive to be of great force; it shows that of all the cases, after the first, not one presented a period of incubation at all equal to that which, to maintain the supposition that it was brought from abroad, we must admit for the first; and, as no measures of seclusion were taken with respect to these patients, it is scarcely explicable on the hypothesis that the disease is communicated by contagion.

But what tends still further to show that in this instance the disease was not introduced by contagion, is, that while cholera existed in this isolated manner in the Dreadnought, and when other parts of London were free from it, some cases occurred in the Marylebone infirmary, situated in a part of the metropolis the most remote from, and maintaining the least intercourse with, Greenwich, where the Dreadnought is stationed.

The reasons given above are, we imagine, sufficient to show that malignant cholera is not propagated by contagion : and the fact that it has prevailed in so many countries and among people so different in every circumstance of social life, proves that it did not depend on food, or on any circumstances or habits which serve to distinguish particular countries or people.

The facts noticed in a preceding part of this paper, in our recapitulation of the progress of cholera, prevent us from ascribing the disease to any atmospheric circumstances that we can appreciate, such as temperature, moisture, direction of winds, electric condition; and the isolated manner in which it has in many instances existed (as in the Dreadnought, in 1837, when it prevailed in that ship, and no other vessel in the river,) does not allow us to ascribe it, solely, to any general atmospheric influence whatever : while the wideness of its diffusion at other times (as in 1832, when it raged at once in a considerable part of Asia, Europe, and America) prevents us from attributing it *exclusively* to the agency of local causes, such as miasmata, filth, defective ventilation, a crowded population; such causes having, moreover, been in action for ages without giving rise to any disease resembling cholera. We can account for the phenomena only on the supposition of some peculiar atmospheric condition, capable of unlimited gradual diffusion, but rendered more active by the local circumstances that have been found most conducive to the disease.*

Symptoms of malignant cholera almost always first show themselves during the period from sunset to sunrise†—in many cases suddenly, without any previous modification of the patient's sensations or general health : but, more commonly, a slight feeling of uneasiness, and some degree of diarrhœa announce the approach of the violent symptoms. These generally commence with watery purging, which is attended with little or no griping, and is seldom preceded by any sensible rigor. The purging is speedily followed by vomiting, and, in most cases, by cramps. The vomiting and purging are frequently repeated. The

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* Dr. Holland has lately suggested, that the course of cholera may be well represented by the propagation and migration of insect swarms. This idea, which certainly accords better with the facts noticed in the preceding pages, than any other hypothesis that has been advanced to explain them, is developed with great ingenuity and ability, in an article entitled, "On the Hypothesis of Insect Life, as a Cause of Disease."

† See Curtis, on the Diseases of India; Jackson's report of Cholera in Paris, in 1832; and a report of Cholera in the Seamen's hospital, Dreadnought, by Dr. Budd and Mr. Busk, published in the *Medico-Chirurgical Trans.* for 1838.

matters discharged contain, at first, the ordinary contents of the stomach and intestines, but subsequently consist of a whitish, turbid fluid, which has been likened to whey, water-gruel, or rice-water. These evacuations, which are either void of smell, or of a faint, sickly odour, are ejected forcibly, without straining or apparent effort, and are often enormous in quantity. The cramps, which begin in the muscles of the extremities, subsequently affect those of the abdomen and chest. The belly of a muscle is contracted into a hard knot with excruciating pain : in a minute or two relaxation takes place, but only for a moment ; the same muscle becomes again violently cramped, or the cramp passes to another, leaving the patient scarcely an interval of ease.

There is often, from the beginning, headache, noise in the ears, vertigo, or deafness. As the disease advances, the patient falls rapidly into a state of extreme prostration : at the end of an hour or two the pulse is often scarcely perceptible, the surface sensibly cold ; and, if an attempt is made to bleed the patient, either no blood flows, or a few ounces only of dark tarry blood, which does not separate, but forms a loose coagulum, is with difficulty squeezed from the arm. The discharges continue, frequently attended with pain at the epigastrium and with slight degree of colic : the temperature of the surface sinks still lower ; the conjunctivæ become dry and glared, the eyes sunk in their orbits : the countenance, especially the nose and lips, assumes a leaden or blue tint, and the same hue is perceivable in the extremities, which are often of icy coldness. The tongue is pallid, or slightly blue, cold, and commonly covered with a thin coating of slimy mucus : the palms of the hands and the soles of the feet are shrunk and sodden, as if long soaked in water ; and the general volume of the body is much diminished. The pulse is feeble and fluttering, or imperceptible ; there is a sense of burning heat at the præcordia, with urgent thirst, and an insatiable desire for cold drinks ; the voice becomes extinct, or feeble and hoarse ; the urine is suppressed, the salivary and all other glandular secretions are arrested. There is dyspnœa, attended with high and rapid breathing, and with an intolerable sense of oppression ; extreme jactitation, so that the patient can with difficulty be kept under the bed-clothes, or in bed. In the midst of this general disturbance the intellect, although incapable of exertion, remains clear ; the memory perfect. At the end of some hours, the violent symptoms subside, the discharges and cramps cease ; but the heat of the surface and the pulse do not return, or they return only slightly and transiently, the patient relapses into his former state, the face becomes bedewed with a cold clammy sweat, and the scene closes in death, sometimes within four or five hours, not unfrequently within seven or eight, but more commonly at the end of twelve, twenty-four, or thirty-six hours from the attack ; the patient retaining his mental faculties to the last.

Such is the general progress of those cases that prove fatal during the cold stage. When this does not happen, after the violent symptoms have continued some hours, and the patient has fallen into a greater or less degree of collapse, the discharges cease or become less frequent, the heat of the surface returns, the skin loses its leaden tint, the pulse regains its power, the anxiety and oppression diminish, bile again flows into the intestines, the secretion of urine is restored : in fact, reaction becomes fairly established, and the disease in its future course assumes one of the following forms :—1. The patient remains feeble for some days, but the convalescence is immediate, and not interrupted by the occurrence of any internal inflammation. This termination is most common in those cases in which the symptoms of the preceding stage have been mild. 2. The recovery is retarded for a period, varying from a few days to several months, by the continuance of gastric and intestinal irritation, indicated by the symptoms we have already described as occasionally occurring in sporadic cholera after the subsidence of the violent symptoms. 3. The collapse is succeeded by a state which has been denominated the secondary fever of cholera, in which the patient presents a typhoid aspect : the cheeks are

flushed, the conjunctivæ suffused, the tongue dry and red ; there is stupor with extreme drowsiness, and occasionally subsultus tendinum, and low muttering delirium. A minute papular eruption often appears on the face and body : but there is no great heat of skin or quickness of pulse.

After having presented these symptoms the patient sometimes recovers, but more commonly falls into a state of complete coma, and, without offering any more obvious signs of local disease, sinks, in some cases after a few hours, in others at the end of a week or more. This secondary fever is more frequent in cases in which the early symptoms are unusually severe, and the cold stage protracted.

We have noticed as characteristic of the cold stage :—1. *The leaden or blue colour of the skin*,—an appearance which has attracted much attention. It results from distension of the capillaries by dark-coloured blood, and varies much in degree, but is most striking when the disease advances rapidly in persons of a full and sanguineous habit. 2. *The diminution of animal heat.* This is greater than in any other disease : the surface of the body, the inside of the mouth, and even the breath of the patient give to the hand a sensation of coldness ; and a thermometer placed under the tongue, which, in ordinary circumstances, indicates a temperature of about 98° F., rises only to 77° or 79° F. Dr. Davy has shown that in the cold stage, even when the inspirations are ample and frequent, the air expired is not only colder than usual, but contains less than the ordinary proportion of carbonic acid. The low temperature of the body in cholera probably depends chiefly on deficient arterialization of the blood, in consequence of imperfect circulation. In morbus cœruleus, in which arterialization is deficient from malformation of the heart, the temperature of the body is likewise many degrees lower than natural.* (*Müller's Physiology, Transl.*, p. 75.) 3. *The character of the blood and of the evacuations.* We have already alluded to the defective circulation, dark colour, and tarry consistence of the blood during the cold stage of cholera. Chemical analysis has discovered in it a great deficiency of water, which, according to M. Le Canu, exists in some cases in less than one-half of its usual proportion ; a diminution in the proportion of fibrin ; and the total absence of a very small proportion of carbonate of soda. The peculiar aspect and consistence of the blood, and its imperfect separation into serum and clot, are the natural consequences of these deviations from its normal state.

In the blood of some cholera patients, who had secreted very little urine for several days, the presence of urea has been detected.†

The gruelly or rice-water evacuations, which form such a striking symptom of malignant cholera, are distinctly alkaline, and consist of a serous or watery fluid containing whitish shreds or flocculi, of the colour and consistence of paste or boiled rice, and of a specific gravity greater than that of the liquid, so that they invariably, after a short time, fall to the bottom of the vessel. The liquid portion, according to the analysis by Dr. O'Shaughnessey, is composed of water, carbonate of soda, and the other saline ingredients deficient in the blood, but contains neither albumen, casein, nor the principles of the bile : the solid portion seems to be a mixture of albumen and casein.‡ Thus, the evacuations contain

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* We have observed similar diminution of animal heat in cases in which there was great difficulty of breathing from extensive emphysema of the lungs.

† The discovery of urea in the blood, in cholera, was made by Dr. O'Shaughnessey, who found as much as 3·66 parts of this principle in 1000 parts of blood, taken from a subject who died of cholera, and who had made very little urine for eight days. Its presence in unusual quantity in the blood, in this disease, unquestionably results from suppression of urine. In ordinary circumstances it cannot be detected in the blood, being separated from it by the kidneys as fast as it is formed ; but in the blood of animals, which lived some days after the extirpation of both kidneys, it was found, by Prevost and Dumas, in very large quantity. (*Roupell on Cholera*, p. 84. *Müller's Physiol. Transl.* p. 151.)

‡ Dr. Bohn, of Berlin, has lately concluded, from microscopic examinations, that the sediment in the evacuations in cholera is composed of fragments of the epithelium of the mucous membrane of the intestines. (*Dub. Journ.*, No. 44.)

the most remarkable of the principles deficient in the blood, and seem to be composed chiefly of its serous part.

In some cases that came within our own observation the evacuations, both from the stomach and intestines after the cold stage had been considerably protracted, assumed a peculiar character, which was apparently owing to the presence of the colouring matter of the blood. Instead of preserving their usual whitish or gruelly aspect, they became brownish, or black, from the suspension in the colourless liquid of brown or black flocculi, sufficiently numerous to impart their colour to the whole mass, as seen by reflected light. When poured on a filter, the colourless fluid, which was not albuminous, transuded, and the brown or black flocculi were left on the paper. In one case, in which the evacuations were of this character, the dejections subsequently became scanty and of a uniform plum colour, evidently from the admixture of blood.

Urea, which exists in unusual quantity in the blood, has also been detected in the bile. Dr. Roupell, to whom we are indebted for the knowledge of this fact,[*] ascribes to its presence in the blood the secondary fever of which we have already spoken,—a state, he remarks, that bears much analogy to that observed in Ischuria renalis.

We have already remarked that, during the great commotion of the system in the cold stage, when the breathing is quick and laborious, and the animal heat no longer kept up, when the blood has almost ceased to circulate, and the various secretions are suspended, the patient retains his intellect. In our attendance on persons suffering under this terrible disorder, nothing has appeared to us more singular than this circumstance; in the last extremity the answers of the patient are quite rational, his memory just; his faculties, however, are blunted; he is averse to all mental exertion, seems unsusceptible of emotion, and exhibits the utmost indifference to his own fate and to all surrounding objects.

Malignant cholera varies in a remarkable degree in the severity of its symptoms, and the rapidity of its progress. The vomiting, purging, and cramps, the most striking symptoms of the disease, are not all present in every case. We have never seen a case in which there was no purging; but practitioners in India have described cases, very rapidly fatal, in which spasm was the only symptom. But in these cases, although no discharges took place, the bowels were found distended with the characteristic fluid. It is not very uncommon, however, to meet with cases sufficiently characterized by the aspect of the patient and the nature of the evacuations, as cases of cholera, in which vomiting or cramps, or both these symptoms, are wanting. Of sixty cases described by Dr. Jackson, in his report of cholera in Paris, in 1832, there were two without vomiting, and five in which there were no cramps. In twenty cases that have recently fallen under our own observation, there were two in which no vomiting or cramps occurred. (*Med. Chir. Trans.* for 1838.)

Prognosis. In London, in 1832, judging from the reported cases, the mortality was about one-half of those attacked; but we are inclined to believe that it was greater than this, and that the proportion of recoveries was increased by the insertion of cases, incorrectly set down as cases of cholera, but retained under this head, in order to render the returns less alarming. In the Dovor, the cholera hospital for seamen, of 160 patients, most of them robust men, well nourished, and in the prime of life, 93, or more than 4 in 7 died; and in this country, as elsewhere, the disease was observed to be most fatal in persons capable of the least resistance—in women,[†] in subjects weak from disease or want of sufficient nourishment, and particularly in the aged and in infants. Ad-

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[*] The analysis was, in this case also, made by Dr. O'Shaughnessey, to whom the bile was sent for this purpose by Dr. Roupell. This bile, which was taken from a patient who had made very little urine for eight days, did not differ in appearance from ordinary bile, but contained, in 1000 parts, 6 of salts, *and 3 of urea.* (*Roupell on Cholera*, p. 84.)

[†] Jackson's report of Cholera in Paris, 1832. Farr on mortality in Cholera, at Rome. Report of British Association for 1838.

vanced age is not only unfavourable to recovery, but predisposes to the disease. Children are said to have been less frequently attacked than adults; and the proportion of deaths was comparatively small in persons between the ages of fifteen and twenty; while the disease occurred more frequently, and was in a remarkable degree more fatal in persons in the decline of life. Many of these points were illustrated by the cases received into the Dovor, which, as they all occurred in sailors, persons similarly circumstanced and leading the same kind of life, who were admitted without any restriction, are well adapted to afford proof of the influence of age, within certain limits, on the liability to cholera, and on the mortality in that disease. Of the 160 patients, 57, or more than one-third, were forty or upwards. By a recent regulation, the ages of all sailors who enter the port of London are registered at the custom-house. We have obtained permission to examine these registers, and have found that of 5,000 sailors, taken consecutively, 961, or considerably less than one in five, had arrived at the age of 40. But the predisposing influence of advanced age is rendered more manifest by taking, in the two classes, ages still greater. Of the cholera patients, 22 in 160, or more than 1 in 8, were of the age of fifty or upwards; while of the sailors registered at the custom-house, 289 in 5,000, or less than one in seventeen, were of this age; so that the proportion of cholera patients of the age of fifty or upwards is more than double what it would have been were all ages equally liable to this disease. The influence of age on mortality is even more clearly shown. The mortality was least in patients between the ages of fifteen and thirty; and in these the number of deaths was less than that of recoveries: it was greatest in patients above the age of fifty: of the 22, who had arrived at this age, only two recovered; the age of each of these two was fifty-three: of 13 whose ages exceeded fifty-three, not one recovered.

The same records serve also to show the influence of previous health on the mortality. 145 cases happened among the crews of vessels in the river, in persons who may be presumed to have been previously in good health; and of these, 82, or about 4 in 7, terminated fatally; while of the remaining 15 cases, which were brought from the seamen's hospital, Dreadnought, and which occurred there in persons admitted for other complaints, 11, or nearly three-fourths, proved fatal. (Vide *Report*, ut suprà.)

Another circumstance that must lead us to form an unfavourable prognosis is unusual severity of the early symptoms. (Vide *Jackson on Cholera in Paris* in 1832.) Experience has shown that those cases which are mild at the beginning, supply a great proportion of the recoveries.

It has been remarked that very few patients recover, in whom there is a *combination* of those symptoms which characterize collapse; loss of pulse at the wrist, great coldness and lividity of the surface, and complete suppression of urine; yet neither these symptoms, nor any character hitherto noticed in the evacuations, can be considered of absolutely fatal augury.

A cold clammy sweat always precedes the fatal termination in the cold stage; it is, therefore, the most discouraging symptom. Cramps, however violent, need not add to our alarm: a case, in which they were more severe than in any other we have witnessed, was in other respects mild; and in this circumstance our experience is confirmed by the general testimony of physicians.

The circumstances, which should encourage us to hope for a favourable issue, are, of course, on the part of the patient, the prime of life, previous strength and good health; as regards the disease, mildness of the symptoms of collapse, and a return of heat, of pulse, and of strength, with the restoration of the secretion and elimination of the urine and the bile,—symptoms which bespeak the establishment of complete reaction. When, however, the collapse has been great or protracted, this reaction should not inspire us with too much confidence: the patient has still, perhaps, to submit to another ordeal, equally to be dreaded, the secondary fever of the disease.

Anatomical characters. In subjects who die in the stage of collapse, the features, after death, are shrunk; the lips, the tips of the nose and ears, the nails of the fingers and toes, are of a leaden hue; the cheeks and upper part of the chest partake somewhat of the same colour, but in a much less degree than during life; and this colour gradually fades after death, while the skin of the entire back becomes of a purple more and more intense, obviously from the blood's gravitating to the latter part. The body and extremities are very rigid, the fingers drawn inwards, the skin of the palms wrinkled.

The follicles at the base of the tongue are generally enlarged.

The mucous membrane of the œsophagus is almost always pale and healthy, but now and then presents conspicuous follicles.

The appearance of the outer, or peritoneal surface of the stomach, and small intestines, varies according to the period at which the disease proves fatal. When death occurs early, or during collapse, the peritoneum is viscid, and the stomach and small intestines are, externally, of a pale rose colour. The viscidity is not observed, or it exists only in a slight degree, and the rose-colour is replaced by the ordinary gray tint of the intestines in those cases that prove fatal after decided reaction. The large intestines are gray externally in every case.

The stomach is generally large, from the distension it has undergone. Its mucous membrane, in some cases, whether rapid or protracted, in bloodless subjects, is pale throughout, but commonly offers, either in the splenic or pyloric extremity, or in both, some degree of redness, arising from the injection of very minute vessels on its free surface. These vessels are not arborescent, but appear as short, red dashes, each about a line in length.

The mucous membrane has rarely undergone any remarkable change in texture, but in most cases it is thickened, and presents a mammellated* appearance, either general or confined to the pyloric extremity. In some instances, by drawing the coats of the stomach between the finger and thumb, and using some pressure, a white opaque fluid is squeezed out, and the mammellated appearance effaced, the mucous membrane of the portion so treated being afterwards smooth and of a normal thickness and consistence. Sometimes, it offers a few patches of adherent mucus: and we have seen a case, fatal at the end of seven hours, in which there was a coating of viscid adherent mucus over its entire surface. In this case there was the mammellated appearance before spoken of, but it could not be effaced by pressure.

The mucous membrane of the duodenum is, in some cases, vascular, in others pale; and now and then it has a grayish appearance, as if dusted with a fine black powder. The follicles, or solitary glands, are in all cases very conspicuous, and give the membrane more or less of a granular aspect; they are always most numerous near the pylorus, become gradually less so as we recede from it, and are not observed in the jejunum.

The coats of the small intestines, when death takes place during collapse, are thickened, and of a doughy feel. The mucous membrane, in some bloodless subjects pale and sodden, generally presents increased vascularity, which occasionally gives rise to patches of a purple colour in the depending portions, especially near the termination of the ileum.† It often exhibits the gray appearance that we have already noticed in the duodenum; this grayness, which results from minute specks at the apices of the villi, is observed especially in cases in

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* This term was introduced by M. Louis, who first described the particular state of the mucous membrane of the stomach which it expresses, and which he considers as the result of chronic inflammation. In this opinion he is followed by M. Andral and other pathologists. We have found it, however, in instances in which the patients during life exhibited no symptom of such an inflammation; and the dissection of patients who died during the cold stage of cholera shows that it may come on very quickly.

† These purple patches seem to result from gravitation of the blood, and to be analogous to the vinous stains on the back.

which the evacuations during life have continued brown flocculi. We have found it in the entire extent of the small intestine, and, in one instance, confined to the jejunum and upper part of the ileum. The texture of the mucous membrane has rarely undergone any appreciable change.

The glands of Peyer are remarkably developed in almost all cases, and generally the most so in those that prove fatal early, or in the stage of collapse. They are of the same colour as the surrounding membrane, and, when the latter is pale, are dotted with black points.

The glands of Brunner may be seen, in almost every case, in the lower portion of the ileum, as small, elevated beads, of the same colour as the membrane; and, like the glands of Peyer, are generally most marked in those cases that prove fatal in the cold stage.

The mucous membrane is, in general, more or less coated with the pasty substance, of which the flocculi in the evacuations consist. The other contents of the intestine are like those discharged during life, and require no particular notice: they are devoid of any fæcal odour, and are tinged with bile in those cases only in which reaction has taken place. In some cases in which reaction was transient, we have seen this biliary tint limited to the duodenum and upper part of the jejunum.

The cæcum and ascending colon are commonly distended, while the descending colon is, in many instances, contracted. The mucous membrane of the large intestine is, in some cases, pale throughout, in others it offers various degrees of redness. It is almost always sprinkled with conspicuous follicles, which are seen as flat, slightly elevated circles, about a line in diameter, with a central black speck; and which, in every case, diminish in number, and become less conspicuous as we recede from the cæcum.

The mesenteric glands, which are generally enlarged, are, in some cases, purplish, and, when cut into, give issue to dark liquid blood; in other cases, they are pale.

The liver presents no unusual appearances: in a few instances, we have observed small ecchymosed spots on its surface, and black fluid blood frequently escapes from the large vessels divided by incission. In all cases that prove fatal during collapse, the gall bladder is found distended with bile of a dark-green or olive-colour. Many pathologists have noticed, in such cases, a stricture at the mouth of the common duct, preventing the flow of bile into the intestine, when pressure is made on the bladder. Of the existence of such a stricture we have not, however, been able to convince ourselves, and are of opinion that further observation is requisite in order to establish the fact.

The pancreas presents nothing unusual.

The spleen is frequently of a light red colour, and, in most cases, of natural size, or smaller than usual, and firm.

The condition of the lungs varies as the patients die at a period more or less remote from the attack. When death occurs speedily or in the cold stage, they are found healthy or simply congested; while in a large proportion, according to the observations of Mr. Jackson, who we believe, first drew the attention of physicians to this circumstance, in one-half of the cases which terminate fatally after the establishment of decided reaction, one or both lungs present unequivocal traces of pneumonia. We have recently made dissections in eleven fatal cases of malignant cholera; and found the lungs healthy or merely congested in four or five cases that proved fatal within thirty-six hours; while, of the remaining six cases, in which the patients lived at least forty-five hours after the attack, four presented the anatomical characters of pneumonia. In one of these cases, which proved fatal at the end of forty-five hours, the pneumonia was very partial, interlobular, and confined to the lower lobe of the right lung; in two, fatal at the end of 96 and 138 hours, respectively, the lower lobes of both lungs were in a state of red hepatization.

The pneumonia, in such cases, is latent, giving rise to no symptoms during

the life of the patient which would lead one to suspect its existence. The fact of its frequently existing, made known to us by dissection, is, therefore, of the greatest practical importance, and shows the propriety of investigating by auscultation the condition of the lungs in all cases in which reaction has been established.

The larynx and trachea sometimes contain a frothy fluid, and their lining membrane often presents increased vascularity; but we have never noticed any change in its texture, or any affection of the pleura in subjects who died of this disease.

The pericardium is sometimes unusually dry and viscid, but much less frequently so, and in a less degree, than the peritoneum. In a few instances, in which the cold stage was very protracted, we have observed ecchymosed spots on the surface of the heart.

The muscular substance of the *heart* is generally flabby and purplish : the ventricles are often contracted, and the heart, when cut into, presents in a slight degree the appearance which has given rise to the designation, concentric hypertrophy. Fibrinous clots are frequently found in the right ventricle, but seldom, and only in protracted cases, in the left; and never in these, unless they exist also in the right. In other cases, in those chiefly that prove fatal during collapse, the ventricles contain dark, fluid, or grumous blood.

In the veins and in the arteries, even in the aorta, the blood is also dark and fluid or grumous; but, like that in the ventricles, it imparts no stain to their lining membrane.

The kidneys are natural in size and texture. In most cases, the cortical substance is purplish throughout, or pale, but offering dark, congested vessels; and from the mammillary points, a whitish fluid, having somewhat the appearance of pus, can be squeezed out.*

The urinary bladder contains only viscid mucus, and is shrunk under the pubis and contracted, in subjects who die during collapse; but we find in it a small quantity of urine in some of the others.

In the organs of the nervous system, there is no trace of disease except a certain degree of congestion in the brain and its membranes, which is met with in some cases.

Nature. Such are the appearances observed on dissection in persons who die of malignant cholera. If we regard the morbid changes with the view of ascertaining the seat and nature of the disease, we shall perceive that the chief of these changes are offered by the coats of the intestinal canal and by the blood ; the condition of the latter, as to colour and fluidity, being sufficient to account for the unusual appearance of other organs in patients who die in the cold stage. In the intestinal canal, the principal alterations are unusual developement of the intestinal glands or follicles, increased vascularity, and unnatural thickness of the mucous coat, from its impregnation, in the entire extent of the stomach and small intestines, with a fluid similar to that constituting the discharges. In the blood, chemical analysis has discovered little more than diminution of its serous part. It will be readily admitted that these changes, although they may serve to explain some of the symptoms of cholera, do not, of themselves, lead us to any certain knowledge of its real nature. Here, as in many other instances, we obtain more insight into the real nature of the disease, by inquiry into its history and symptoms. In the very threshold of this inquiry, two questions naturally arise :—

1st. Is malignant cholera essentially different from sporadic ? The nature of the evacuations forms a striking mark of distinction between the diseases

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* Some pathologists have laid great stress on the white, creamy fluid, that can be expressed from the mammillary points of the kidney, as a character peculiar to malignant cholera; but we have met with it in subjects who died of other diseases. It probably consists of mucus and the constituents of the urine in a state of concentration.

which we have thus contrasted. In the latter they contain an unusual quantity of bile: in the former, at a certain period, they are devoid of this principle, and present the characteristic appearances we have described: and this difference in the nature of the evacuations does not depend on the greater severity of malignant cholera. Some cases of malignant are not more severe than cases of sporadic cholera, but are still contrasted with them in the colour and character of the evacuations. The blue colour of the skin, that gives such a peculiar aspect to malignant cholera, is rarely remarked in sporadic: it results in the former from the condition in which the blood is left by the loss of its serous part. But there are other circumstances which show that the diseases are essentially different: malignant cholera occurs at all seasons, sporadic cholera almost exclusively in autumn: the former disease in the majority of cases proves fatal, and often at the end of a few hours; in the latter, patients generally recover, and when the disease does terminate fatally, it is seldom in less than two or three days: in one, cases occur sporadically; in the other, the disease is epidemic.

2dly. Was malignant cholera known to the ancients? There are some passages in the works of Aretæus and Celsus which have led to the supposition that those authors were acquainted with this disease. Aretæus describes the evacuations in cholera as being, " at first, stercoral; then pituitous, afterwards bilious." Celsus says that the evacuations are of various colours, " sometimes black, sometimes white." But these incidental remarks do not justify us in concluding that these physicians were ever called on to treat malignant cholera. Men so observing would surely have noticed in more express terms characters so peculiar as those presented by the evacuations in this disease. Besides, their general description of cholera, the time and manner of its appearance, are in accordance with the observations of modern physicians on sporadic cholera, but not at all applicable to the pestilence by which we have recently been visited.

We infer, then, that malignant cholera is essentially different from sporadic, and that it has only recently appeared in Europe. It will be readily seen that this inference confirms the conclusions arrived at in a former chapter that the disease has its origin in some new and peculiar principle.

The supposition advanced by an ingenious author,* that malignant cholera consists in inflammation of the mucous coat of the stomach and intestines, is opposed by the fact, that inflammation of these viscera occur in their greatest severity without giving rise to the same symptoms; and that the appearances after death do not accord with the ordinary effects of inflammation. Besides, if this disease be simply inflammation of the coats of the intestinal canal, why have we not witnessed it until the last few years? The history of medicine offers examples of the occurrence of new specific diseases, but there is no evidence that there have been any modern additions to the list of simple inflammatory affection. The recent origin of malignant cholera, then, as well as its epidemic nature, concur with the reasons above assigned, and prevent us from considering it a simple inflammation; a supposition, indeed, utterly untenable: while the peculiar character of the evacuations, the unusual developement of the intestinal follicles, the rapidity with which the disease proves fatal, its wide diffusion, and the permanence of its essential characters in circumstances the most various, show that it every where depends on one and the same special cause; a cause, whose first effects are manifested in derangement of the functions of the intestinal canal, but which exerts on the economy the action of a powerful poison.

If we consider the symptoms in order to ascertain the manner in which this poison acts, we arrive at no definite conclusion. It will be seen from our remarks on treatment, that many of the most striking symptoms, the disorder of

* Broussais.

circulation and respiration, diminution of animal heat, thirst, the leaden hue of the skin, the prostration and the spasms, result from the condition in which the blood is left by the elimination of its serous part. The almost total suppression of urine and other glandular secretions, is probably an effect of the same cause. It is this elimination, therefore, this intestinal hæmorrhage, if we may so term it,* that constitutes the fundamental and primary symptom of the disease. But to what is this elimination owing? Is it caused by direct action of the poison on the coats of the intestinal canal, or does it result from absorption of the poison and subsequent morbid condition of the blood itself? Dissection does not enable us to give a satisfactory answer to these questions; but there are some circumstances in the history of the disease which render the latter hypothesis by far the more probable. We could adduce many instances which scarcely leave a doubt that the disease does not manifest itself immediately on exposure to the influences that produce it, but that it has a period of incubation, short, certainly, in many cases, but still sufficient to render it improbable that the symptoms are produced by the direct local action of an irritating agent. Again, the fact that one person is attacked while others escape, who, as far as we can judge, have been exposed to precisely the same influences, is analogous to what happens in the case of other diseases produced by absorption of a virus, but is scarcely explicable on the supposition that the symptoms are caused by the direct impression on the coats of the intestinal canal of an agent of such extraordinary power.

Whatever be this agent the almost constant accession of the violent symptoms during the night renders it probable that its influence is then more powerful than by day.

Treatment. There is no disease in which it is more difficult to estimate the effects of remedies than in cholera. This arises in part from the difficulty of appreciating the share which the circumstances of age and sex, previous health and nourishment have in determining the issue; but chiefly from the great difference in the severity of individual cases. The mortality has been found to vary in different epidemics, and greatly in different periods of the same epidemic, without our being able to ascribe this variation to any difference in the treatment adopted or in the previous condition of the patients. We have already stated that the mortality in the *Dovor*, in 1832, was 93 in 160, or about 5 in 9; while, during the epidemic in 1834, in the *Echo*, by which the *Dovor* was replaced, it was 12 in 36, or only 1 in 3.

In 1834, the duration of the epidemic in London was less than six weeks: in 1832, the first cases occurred in February, and the disease did not disappear from the metropolis until the January following. Its greater mildness, as the epidemic approached its termination, is shown by the records of the Dovor. Of 137 cases admitted from the 20th May to the end of September, 86, or more than 5 in 8, proved fatal; while of 21 patients received during the months of October, November, and December, 15 recovered.

Before then, any positive conclusion can be arrived at respecting the efficacy of different modes of treatment, the patients must be classed: regard must be had to the age, the sex, the previous health and regimen of the patients, as well as to the period of the epidemic, and to its general character as to mildness or malignity; and we must be careful not to draw general inferences from a small number of cases. The subject has not yet been studied in this manner; and it is to want of precise data that the reader must ascribe the vagueness of the following remarks on some of the modes of treatment that have hitherto been recommended.

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* The word *hæmorrhage* is not strictly applicable, even if used to express the escape of the serous part of the blood only; since, in malignant cholera, there is not simply an escape of the serum, but also a separation of its albumen, which does not exist in the liquid part of the evacuations.

Heat and friction have been employed, in order to restore warmth and to lessen the severity of the cramps. To the first object they certainly contribute in mild cases; but in very severe ones they generally prove ineffectual: for the second, namely, alleviation of the torments occasioned by cramps, no means have proved so successful as diligent friction. The relief given by it is immediate, and it is not uncommon for patients, at each recurrence of the spasm, to implore its repetition. It may be performed by the hand, with flannels, or with a small hand-brush. A good mode of applying heat is by bags of hot bran, or sawdust, which retain their heat a long time; but one still better, is the hot-air bath.

When practised at the onset, before the circulation has become too languid, bleeding seems to have some influence in arresting the course, or mitigating the severity of the disease; but it seldom happens that the patient is seen at that time, and at the end of an hour or two, when the surface is cold, either no blood will flow, or we can squeeze from the arm a few ounces only of thick tarry blood, the abstraction of which is in general followed by no amendment. In extreme states of collapse, the temporal, or even the radial artery has been opened, and no blood has flowed. It is difficult to estimate the effect of bleeding, in the early stage of the disease, from the circumstance that it is most frequently practicable in cases, which at their origin are comparatively mild, and which experience has shown to be those in which a favourable issue is most common.

But there is another period at which bleeding can be practised, namely, after the establishment of decided reaction; and here it seems to have been productive of benefit in moderating inflammation of the abdominal viscera, or the pneumonia, which exists so frequently in the secondary fever of this disease.

Opium is useful in checking diarrhœa on its first appearance, and, in conjunction with bleeding at the onset, has, in some cases, seemed to arrest the disease; but, when considerable collapse has taken place, opium exerts no essential influence.

Mustard emetics and ipecacuanha, like almost every other remedy, in turn* have been extolled in the treatment of cholera; but extended experience has not warranted the panegyrics of their advocates.

Calomel, in scruple doses, frequently repeated during the cold stage, has been strongly recommended by practitioners in India. It has been supposed to have great virtue in restoring the natural secretion of bile, and in promoting its flow into the intestines; a circumstance which, at this period of the disease, generally betokens a favourable change in the condition of the patient. The plan has been extensively tried in this country, but its results have not justified the encomiums that have been so liberally bestowed upon it; in fact, the great and nearly equal rate of mortality under this and every other mode of treatment that has hitherto been adopted, is sufficient to show the general inefficacy of them all.

The treatment of cholera by salines was first suggested by Dr. Stevens. Its adoption was founded on the opinions he held respecting the nature of the disease, which he supposed to consist essentially in deficiency of the saline ingredients of the blood. This deficiency it was his object to restore; and he advised, for this purpose, that the patient should take, every half-hour or hour, according to circumstances, half a drachm of sesquicarbonate of soda, a scruple of muriate of soda, and seven grains of chlorate of potash, dissolved in half a tumbler of water. We have seen this plan tried in some cases, certainly not with the good results promised by its early advocates, and we believe that, at present, most medical men agree with us in considering it a remedy of very doubtful efficacy. The deficiency of saline ingredients in the blood is the effect not the cause of the disease, and arises from the continual elimination, through

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* The supreme court of Ava recommended, as an infallible specific, that the inhabitants should wear in their ears a scrap of paper, on which was written the title of the presumptive heir to the throne. (*Moreau de Jonnes.*)

the stomach and intestines, of the serous portion of the blood in which these salts are dissolved. The saline ingredients, which it is attempted to restore, are, therefore, already in the intestinal canal, and would be again absorbed, if the mucous membrane of the stomach and bowels were in a state to perform this function; but the fact is, that this membrane is in a condition the very reverse of absorbent; and it is this condition that prevents us from entertaining very high expectations from any remedy applied to its surface. A more heroic and more promising method of introducing salines was first proposed by Dr. O'Shaughnessey: it consists in injecting a solution of them into the veins. This plan was extensively tried in Edinburgh by Dr. Mackintosh. He employed a solution of Ʒss of muriate of soda and Ɔiv of sesquicarbonate of soda in ten pints of water, at a temperature varying from 160° to 120° Fah.; this solution was injected slowly, half an hour being spent in the gradual introduction of about ten pints. The immediate effects of this treatment are very striking, and show that a large share of the symptoms of malignant cholera is owing to loss of the serous part of the blood. After the injection of a few ounces, the pulse, which had ceased to be felt at the wrist, becomes perceptible, the heat of the body returns. By the time three or four pints have been injected, the pulse has become good; and cramps have ceased; the body, that could not be heated, has become warm; and instead of a cold exudation on the surface, there is a genial moisture; the voice, before hoarse and almost extinct, is now natural; the hollowness of the eye, the shrunken state of the features, the leaden hue of the face and of the body, have disappeared, and the expression has become animated; the mind cheerful; restlessness and uneasy feelings have vanished; vertigo, noise in the ears, and sense of oppression at the præcordia, have given way to comfortable feelings; thirst, however urgent before the operation, has ceased. The secretion of urine was soon restored; but in this, says Dr. M., (from whom we have borrowed the substance of the foregoing description), we were more frequently disappointed than in any of the other favourable symptoms. But these promising appearances were not lasting; the discharges continued, and the evacuations became even more profuse; the patient soon relapsed into his former state, from which he might again be roused by a repetition of this injection, but the amendment was transient, and the fatal period not long deferred. Of 156 patients treated in this manner at the Drummond Street Hospital (of which Dr. M. was physician), only 25 recovered,—a small proportion. It is proper, however, to add, that this method was adopted only in cases considered hopeless.

The result of these cases proves, what we have before stated, that loss of the serous part of the blood does not constitute the disease, although the elimination of this part, by leaving the blood in a condition, in which it is difficult of circulation and unfit for the functions of the viscera, is productive of many of the most striking symptoms of cholera; and, in some cases, perhaps, the immediate cause of death itself.[*]

We have dwelt on this plan on account of the immediate and striking effects that have followed its employment, and the insight it has given us into the cause of many of the phenomena of the disease; but chiefly, because, from the unfavourable condition of the intestinal canal for absorption, we consider this method of introducing our remedies as most likely to lead to future success. Salines have already been tried, but there still remains a class of drugs, of a wide range, to which the same method is applicable. We know that many drugs, injected into the veins, have the same effect as when given by the mouth: tartar emetic,

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[*] The collapse seems to depend chiefly on the blood's not being sufficiently liquid to circulate. It appears from the experiments of Prevost and Dumas, that the vivifying power of the blood resides mainly in the red particles. An animal bled to syncope is revived by the injection of blood of one of the same species, even when this blood has been deprived of its fibrin, but not by the injection of water, or pure serum. The effect of such injection in the cold stage of cholera, results from its causing the red particles, which are already present, to circulate.

for instance, brings on vomiting as certainly when administered by the former method as by the latter. But, in recommending experiments of this kind, we of course advise that they should be first tried in extreme and hopeless cases. There is, however, one objection to this method, which must not be lost sight of, and which may always be urged against the employment of it in mild cases: we allude to the occasional production of fatal phlebitis.

Acetate of lead, which, in conjunction with opium, has long been found of service in dysentery, has been lately recommended, in very strong terms, by Dr. Graves, of Dublin, as a remedy for cholera. He orders a scruple of ace-tate of lead and a grain of opium to be made, with conserve of roses, into twelve pills, and one of these pills to be given every quarter of an hour during the stage of collapse; otherwise, every hour, or every two, three, or four hours. We have tried this plan in a few cases only, and consequently are not entitled to pass judgment on its merits: the high character of its proposer, and the con-fident tone in which he recommends it, will, we trust, in the event of a return of cholera, induce others to submit it to the test of experience.

The methods of treatment above mentioned are principally applicable to the cold stage of cholera. When reaction has taken place, or the stomach has ceased to reject liquids, and has become again disposed to absorb, the most important indication is to avail ourselves of this organ as a channel through which to repair the loss the blood has sustained in its serous part.* This is best accomplished by giving liquids frequently and in small quantities. We have employed soda water at this period, and would strongly recommend it on account of its being easily tolerated by the stomach, and from its containing some of the saline ingredients, which are deficient in the blood. The prescrip-tion of Dr. Stevens seems to promise advantages in this stage of the disease.

When speaking of the appearances on dissection, we remarked the frequency of pneumonia in cases that prove fatal after reaction. On account of this frequency, and the latent form in which pneumonia exists in these cases, we again urge the importance of examining by auscultation the condition of the lungs in all cases in which reaction has been established. Where the presence of pneumonia is ascertained, we would advise bleeding from the arm, or by cupping, and are inclined to give preference to the latter method. Experience has shown that, notwithstanding the profuse evacuations that have taken place, it may be had recourse to with perfect safety. On the prudent employment of this remedy and on the administration of salines, we must chiefly rely when the complication in question exists. We do not advise any treatment more specific, such as that by tartar-emetic, so advantageous in idiopathic pneumonia. If con-valescence be retarded by inflammation or irritation of the intestinal canal, we may employ the means recommended for the treatment of cases of sporadic cholera having a like termination.

We cannot quit our subject without remarking the inefficacy of the quarantine regulations, which have been enforced with the view of preventing the extension of this disease. The knowledge of this inefficacy, which the experience of Asia and Europe has amply proved, will, we hope, prevent the future adoption of measures so injurious to the commercial interests of this maritime country.

The especial prevalence of malignant cholera in the low, crowded, and filthy quarters of towns, and the marked immunity of the quarters inhabited by the wealthy, are, we conceive, circumstances which supply cogent motives for the adoption of every measure calculated to increase the salubrity of the former districts and to improve the health of the inhabitants.

* We have before remarked, that the secondary fever of cholera has, with much plausibility, been ascribed to excess of urea in the blood. This principle accumulates, owing to suppres-sion of the urinary secretion, which suppression is caused by the deficiency of the more liquid parts of the blood. It should, then, be our first object to make up this deficiency; and we are consequently led to consider the indication specified above, as one of singular importance.

ORGANIC DISEASES OF THE INTESTINES.

Tuberculous Disease of the Intestines.

TUBERCULOUS deposit on the interior surface of the intestines is seldom, if ever, met with in an uncomplicated form. The disease may be said to be always accompanied by pulmonary tubercle, after the age of puberty. M. Louis found the small intestine affected in one third, and the large in one-ninth of his cases of phthisis.

Tubercle is deposited principally in the glands of Peyer, and in the isolated follicles. In the first stage, these bodies are only distended with the morbid substance, the mucous membrane above them being perfectly sound ; in this state resembling the early period of the follicular lesions of typhus. In the process of ulceration, the mucous membrane is first destroyed, then the tuberculous matter itself, and afterwards the muscular coat, till the base of the ulcer is formed by the peritoneum only.

The symptoms in the first period of the disease may be completely latent, but the subsequent changes generally produce diarrhœa, which harasses the latter days of the phthisical patient. But we have known such ulcerations exist, without any local symptoms of importance. For further details on this subject, the reader is referred to the article, TUBERCULOUS DISEASE OF THE LUNGS.

Carcinoma of the Intestines.

The portions of the alimentary canal, in which this disease has hitherto been detected are, the œsophagus, the stomach, the duodenum, the commencement of the jejunum, the cæcum, the colon, and the rectum. The most frequent seats are the stomach and the rectum. The anatomical characters of carcinoma in the large intestine differ so little from those of the stomach, that we think it superfluous to describe them. It may be remarked, however, that the caliber of the intestine being normally less capacious than of the stomach, the former suffers more from the encroachments of the morbid growth. When the disease attacks the cæcum, there may be very little obstruction : in the sigmoid flexure of the colon we have seen the passage reduced to the size of a quill.

The symptoms are circumscribed pain, of a lancinating character, obstinate constipation, vomiting and tympanites, but they suffer great variation. The pain may be wanting, and if the stricture is not considerable, or if ulceration has taken place, we may find diarrhœa, instead of constipation. The vomiting usually occurs several hours after the principal meal, about the time when the alimentary matters reach the diseased portion of the gut. Sometimes the paroxysms closely resemble the symptoms of strangulated hernia. The real nature of the case has often been unsuspected during life ; but when a hard tumour can be detected in the region either of the cæcum, or of the sigmoid flexure, and the signs of the cancerous cachexia present themselves, there will be less difficulty in the diagnosis. These and other signs, however, are often obscured by ascites, by chronic enteritis, and other complications.

The treatment is altogether palliative. We administer anodynes for the pain, and mild laxatives to insure such an amount of secretion, that the contents of the bowels may be of a fluid or semi-fluid consistence, and therefore pass more easily. We also endeavour so to regulate the diet that it shall be soluble,

compendious, and leave as little excrementitious residue as possible. By atten-
tion to these particulars, life may be considerably prolonged, and suffering
diminished.

Non-malignant Stricture of the Colon.

The most common form of this disease is the indurated and hypertrophied
condition of the submucous cellular membrane consequent upon chronic dysen-
tery. We have noticed two other forms not described by authors. In one of
them the stricture was situated in the arch of the colon, and appeared to have
been caused by a folding inwards of nearly half an inch of the gut, with hyper-
trophy of the submucous and mucous tissue in this part. But there was no
ulceration in this part. The gut was enormously dilated on the cæcal side of
the stricture, and adherent to the parietes of the abdomen, and in one part per-
forated by an ulcer, which communicated with an abscess in the parietes, of
considerable extent. It appeared to us that the origin of this disease might have
been a small invagination, which became permanent by adhesive inflammation
of the peritoneal covering. This view was confirmed by our finding the omen-
tum puckered, or rather plaited in, at the seat of the disease.

In the other case, the stricture was seated just above the termination of the
colon in the rectum, and was caused by hypertrophy of the adipose tissue under
the serous covering. The passage barely admitted the point of the little finger.
Throughout the colon there was a great number of small pouches, appearing at
first like round follicular ulcers, but on examination, the mucous membrane was
found entire within ; they were evidently mere dilatations of those crypts, or
cæcal appendages, called by Boehm *glandulæ simplices majores*.

ALVINE CONCRETIONS.

Substances of considerable hardness, and dissimilar to the usual contents of
the alimentary canal, have been found in the stomach and intestines after death,
and more rarely have been discharged by vomiting or by stool. In the human
subject, they are more frequent in the intestines than in the stomach. They
consist, for the most part, of the natural secretions of the digestive organs, con-
crete bile, and tenacious mucus, accumulated and indurated, and intermixed with
extraneous substances ; such as earthy matters, the husks of seeds, fruit stones,
fish-bones, &c. The latter bodies are generally nuclei ; more rarely they are
conglomerated and cemented with mucus. In other cases, they are altogether
of an earthy composition ; consisting of magnesia, or carbonate of lime, which
had been taken in excessive quantities to neutralize acidity in the stomach.

The size of intestinal calculi varies from that of a pea to that of an orange ;
and the large are of more irregular figure than the small. It is rare to find
more than two in the intestines ; but Dr. Monro observed twelve in the colon of
a boy. When existing in the stomach, their number may be considerable.
Lazoni met with ten, and Bilguer with thirty in this organ.

For a very full and precise account of the physical qualities and chemical
constitution of these bodies, we refer the reader to Dr. Monro's "Treatise on
the Morbid Anatomy of the Gullet, Stomach, and Intestines ;" from which we
extract the following propositions, embodying the substance of the author's ex-
tensive observations on this curious subject :—" 1. That the greater number of
intestinal concretions consist chiefly of fibres of the beard of the oat, which are
intimately matted together, and which, probably have been attracted by a
central nucleus. 2. That intestinal concretions occasion a derangement of the

functions of the alimentary canal, and create griping, obstinate and long-continued colicky pains, which are generally limited to that part of the intestinal canal which contains the concretion, and which are occasionally more severe upon the patient taking acids or food of difficult digestion. 3. That intestinal concretions may be generally felt within the intestines, and when two or more of these are lodged within the intestines, they may be made to strike against each other. 4. That intestinal concretions frequently change their situation and pass down into the rectum, which is thereby much extended, and, when so situated, occasion acute pain and sense of weight in the back part of the pelvis, with a constant desire to go to stool, which the patient cannot gratify; and they may, by the finger, or by an instrument introduced into the rectum, be felt within it. 5. That intestinal concretions, formed within the human alimentary canal, are, in some cases, discharged by vomiting, or along with the fæces. 6. That an intestinal concretion, after a certain time, cannot be moved from one portion of the alimentary canal to another, owing to its increase in bulk, to the expansion of the coats of that part which contains the concretion into a sac, and to the unnatural constriction immediately below the seat of the alvine concretion. 7. That intestinal concretions must prove a mechanical obstruction to the passage of the aliment through the intestines; and if proper means be not taken to remove the cause of the obstruction, inflammation of the intestines follows, which proves fatal. 8. That, in the earlier stages of the disease, while the concretion may be moved from one part of the intestines to another, all that can be done is to operate on the bowels, partly through the medium of mechanical action, and partly by lubricating the alimentary canal by the exhibition of proper medicines, in order that the concretions may be discharged along with the fæces, or may descend into the rectum, from which it may be artificially extracted. 9. That after the disease has been of long standing, and when a sac has been formed, which retains the concretion in a certain place, it cannot be removed, should it be lodged within the colon, but by an incision, as there is little or no chance of dissolving the stone within the intestine by any medicines given internally."

A vast number of cases are collected in the work of the indefatigable Scheuckins, under the head of *Intestinorum Lapis sive Tartarus*. (*Observ. Med. Rar.*, p. 387.)

Foreign bodies are occasionally pent up in the cæcum, and occasion very serious results. If small enough to become impacted in the *appendix vermiformis*, they almost inevitably give rise to fatal peritonitis. In Cruveilhier's *Anat. Path.*, liv. xxvi., is a case in which an immense accumulation of cherry-stones was found in the cæcum and a part of the colon. Their transmission had been intercepted by a stricture in the latter bowel. During life, the tumour caused by the accumulation gave to the hand a feeling of crepitation like that of emphysema; but it was caused by the friction of the cherry-stones upon each other. It was proved that the fruit must have been eaten a twelvemonth before the decease of the individual.

FATTY DISCHARGES FROM THE INTESTINES.

Of late years attention has been recalled to alvine discharges of a fatty nature, by the researches of Dr. Bright, Dr. Elliotson, and Mr. Lloyd. We have met with persons suffering from functional disorder of the stomach and liver, who frequently passed lumps of matter resembling adipocire. Sometimes the oleaginous matter is discharged in a fluid state; in other cases it has looked like butter which had been melted and then cooled. The formation of this matter is

not understood; nor is there any particular disease, or seat of disease, with which we can pronounce it to be invariably associated. Dr. Bright has related some extremely interesting cases, in which malignant disease of the duodenum and the head of the pancreas coexisted in addition to disease of the liver, and obstruction of the gall-ducts. As hepatic diseases and bilious obstruction continually occur without the peculiar discharges under discussion, there can be no essential connexion between the former and the latter. Disease of the duodenum alone is often met with unattended by such excretions, and the same may be said of disease of the pancreas; but Dr. Bright seems inclined to think that the combination of the two is somewhat closely connected with the peculiar formation; whether, however, by means of disordered secretion, or of imperfect alimentation, he does not pretend to say.

Dr. Elliotson relates several cases, taken partly from the works of writers in the Ephemerides, of Fabricius Hildanus, Tulpius, and the Edinburgh medical essayists, and partly from his own experience. In one of the latter, the discharge occurred in a patient who laboured under phthisis and diabetes. Dr. Elliotson quotes an instance from the *Annali Universali*, of a man who, having brought on a fit of indigestion by fasting, and afterwards partaken of indigestible food, took to vomiting large quantities of what looked like melted fat. It once amounted to thirty pounds in twenty-four hours. The patient eventually recovered. We are acquainted with a lady who for a long time suffered a great variety of anomalous symptoms, chiefly referrible to the digestive organs, and who frequently discharged an oleaginous matter from the bowels. She is now in good health.

Patients have frequently directed our attention to substances discharged by stool, which they supposed to be peculiar formations, or to have come from internal abscesses, but which, on examination, turned out to be portions of meat; particularly of the cellular and adipose parts, which had not been properly masticated, and having been scarcely at all acted upon by the gastric juice, had created great irritation in their passage through the canal, and finally had been mistaken for morbid products.

We are not acquainted with any specific treatment applicable to cases of fatty discharge from the intestine.

HÆMORRHOIS.

1. Hæmorrhois.—Simple.—Nature.—Treatment.—2. Hæmorrhoidal tumours.—Anatomical varieties.—Mode of production.—Number, size, and appearance.—Symptoms.—Causes.—Treatment.

THIS term includes both the hæmorrhage, which occurs at the termination of the rectum, and the tumours on which it frequently depends, but which may exist without causing discharge of blood. We shall speak first of simple hæmorrhage from the rectum, and afterwards of hæmorrhoidal tumours.

1. The most common source of *Simple Hemorrhois*, is a congestion of the mucous membrane of the rectum, from the capillaries of which, blood is effused during and after the expulsion of fæces. The congestion may be only a part of the general plethora of the system; but the determining cause of the hæmorrhage is the interruption to the local circulation, caused by the passage of hardened fæces, or by the mere muscular action of expulsion. In other cases, the congestion is entirely local, and may then be occasioned by obstruction of the portal circulation, or by a relaxed and pendulous condition of the mucous membrane, which causes its extrusion during a stool, and a consequent exudation of blood from its surface. The quantity discharged in the latter case is generally

trifling. In some instances, simple hæmorrhage is caused by a slight fissure of the mucous or cutaneous surface at the margin of the anus. Such fissures are produced either by large indurated stools, or by psoriasis of the skin; in the latter state the surface may at any time be ruptured by the ordinary action of the sphincter.

A third and frequent cause, though often overlooked, is a small vascular point on the surface of the mucous membrane, from which a minute artery throws a jet of blood every time the bowel is evacuated. This may be unfelt, and the hæmorrhage may occur daily, unknown to the patient and to his medical adviser, till general anæmia awakens a suspicion of the true nature of the disease.

The remote causes of simple hæmorrhois are so similar to those of hæmorrhoidal tumours that it is unnecessary to enumerate them in this place.

The hæmorrhoidal flux is often felt to be so salutary, that the patient rather hails its appearance, than makes complaint of it. But the affection, when long continued, should never be neglected, however great the relief it may occasion at the time. If it is connected with general plethora, it will be proper to abstract blood from a vein, to restrict the diet, and perhaps to effect a vicarious discharge in the form of an issue. When the portal circulation is congested, saline purgatives, mercurial alteratives, and cupping over the right hypochondrium may be ordered. In females ceasing to menstruate, cupping over the loins will be found useful.

The passive hæmorrhage, resulting from relaxation of the mucous membrane, must be treated by cold water enemata, astringent lotions, and injections (as of Sulph. of Zinc, and Alum or Acet. of Lead), cold sponging, the cold hip-bath, and support of the anus by means of a spring pad, connected posteriorly with an elastic belt, or when this cannot be procured, by a firm compress, and a well adjusted T bandage. To the bleeding tubercle alluded to above, a small ligature must be applied, or it may be touched with nitrate of silver. But if there is difficulty in accomplishing this, the compression exercised for several hours by a firm bougie may be sufficient to obliterate the vessel.

2. *Hæmorrhoidal tumours*, or *piles*, are often distinguished as *external* and *internal*, according as they project or not beyond the margin of the anus; and *blind* and *bleeding*, according as they are attended or not with hæmorrhage; but we shall endeavour to discriminate them according to their *anatomical characters*.

1. The tumour may consist merely of one or several hæmorrhoidal veins, varicose, more or less thickened, and covered with mucous membrane or skin (according as it is within or just upon the margin of the anus), which covering is felt movable over the elastic swelling beneath. These varicose tumours are often accompanied with thickening of the adjacent tissues, mucous, cellular, and cutaneous.

2. The tumour may comprise one or more cysts filled with coagulated blood. The cysts are, we believe, caused by obliteration of the venous pedicles, the varicose parts remaining distended, though some maintain that the cysts are formed at the expense of the cellular membrane, into which blood or serum has been extravasated.

3. The tumour may be a cellulo-fibrous structure, more or less vascular. A tumour of this kind is generally of long standing, and probably originated in a varicose state of the vein, though the changes of the surrounding tissues have obliterated the traces of the latter.

4. It may resemble a warty excrescence growing at the distance of a line or two, or three-fourths of an inch beyond the anal margin. It is either cellulo-fibrous or encysted, and has been formed similarly to the second and third variety described above. The distance of such tumours from the anus is easily explained. The mucous membrane being often prolapsed in hæmorrhoidal affections, carries the tumours away from the margin of the anal opening, and

undergoing in time a cutaneous transformation, gives the tumours the appearance of having grown from the part of the skin in which they are observed.

5. Another form is an accidental, erectile tissue, growing from the mucous membrane.

6. The last variety consists of a fold of skin and mucous membrane, the cellular tissue being loose beneath. Tumours of this kind are often numerous; sometimes, indeed, the whole circumference of the anus is so puffed and lax, that the contraction of the sphincter puckers it into a coronet of tumours.

The above varieties may be arranged into three larger groups. In the first, the important anatomical character is dilatation of the veins, with or without alterations of the mucous membrane, skin, and cellular tissue. These alterations depend on the age of the tumour, and the irritation to which it has been subjected. The character of the second group is, the accidental erectile tissue; and of the third a puckered state of the integuments. These last may be called false hæmorrhoids.

Mode of production and development. When the circulation in the hæmorrhoidal veins has become torpid, a little more determination of blood to the corresponding arteries than usual may cause their distension ; or an increase of pressure above may have the same effect. The tumours may then merely project into the gut, or appear at the anal aperture, and subside again shortly ; or, what is frequently the case, the swollen part is extruded during an evacuation, and is not withdrawn before the contraction of the sphincter ; in consequence of which, the tumour is to a certain extent strangulated, the distension of the vein increased, and the capillaries of the mucous membrane congested. The frequent repetition of this accident leads to the production of a permanent tumour. The dilated extremity of the vein becomes a pouch ; inflammation in the cellular and mucous membrane induces adhesions, thickening, and hypertrophy ; the communication with the venous branches being in some cases diminished or obliterated, in others remaining entire. These consecutive lesions are still farther promoted by the passage of costive stools, the friction of the tumours in walking, or by pressure in sitting. When the strangulation has been considerable and long continued, the tumour may slough. The varicose tumours may become fluid or shrivelled, and remain indolent for years, or they may be subject, at intervals, to congestion and inflammation.

It is not easy to say what determines the first formation of the erectile tumour. In some cases it appears to consist chiefly of mucous and cellular tissue, highly vascular and hypertrophied ; in others, it is formed altogether by hypertrophy of the capillary web of the mucous membrane. It may be safely referred rather to direct local irritation and to active congestion of the arterial extremities, than to remora in the veins. The arteries leading to such tumours have been found of unusual caliber. Dr. Collis gives the following description of such vessels : —" On slitting up the rectum I saw three blood-vessels, each as large as a crowquill, running for some way down the intestine, and then dividing into a number of branches ; these vessels ramified very profusely, and each seemed by interweaving of its branches to form one of these tumours. The trunks and branches were covered only by the lining membrane of the intestine." (*Dublin Hosp. Reports*, vol. i. p. 152.)

Number, size, and appearance. The venous hæmorrhoids vary in bulk from that of a pea to a pigeon's egg. When small, we may feel them thickly studding the interior of the gut, nearly as far as the finger can reach. Sometimes a single swelling projects beyond the anus, resembling either a red currant, or a small black grape, according to the degree of compression it suffers from the sphincter. The erectile or fungoid tumours may be as minute as a pin's head, or as large as a strawberry, which they often resemble in appearance. Sir James Earl describes one that measured nine inches in circumference.

The *symptoms* are for the most part local, consisting of a sense of fulness, itching, throbbing, heat, tenderness, dull or shooting pain, tension, tenesmus,

hæmorrhage, and mucous or sero-mucous exudation. The varicose tumours have very little sensibility when first protruded, but when strangulated or inflamed become exquisitely tender. The hæmorrhage is generally from the mucous covering, but, in some cases, it proceeds from a rupture of the vein itself. The latter accident is not, in our opinion, of frequent occurrence; much of the suffering from hæmorrhoids depends on the congested or inflamed state of the adjacent tissues.

The vascular hæmorrhoids vary in sensibility; the chief inconvenience is the hæmorrhage which they occasion, and which is often very profuse.

The false hæmorrhoids are often very distressing: they may become tender, excoriated, fissured, sometimes intolerably itching, and are often attended by, if not productive of, prolapsus of the gut.

The general symptoms are chiefly sympathetic fever, when the local inflammation is severe, or faintness, exhaustion, and nausea from the pain and the hæmorrhage. When the hæmorrhoids interfere with the evacuation of the bowels, the general inconvenience is much aggravated. There are often sympathetic pains in the loins, and in the region of the uterus and bladder; hence micturition is by no means uncommon.

Persons are often subject to what is called an *attack of piles*—that is, the veins are either temporarily distended, or the tumours left by former attacks become enlarged. The hæmorrhage, or sero-mucous discharge, is sometimes a great relief to the whole system, removing congestions of the head, of the lungs, of the stomach, and of the liver, in a remarkable manner; while, on the other hand, the sudden subsidence of the tumours, or the suppression of their discharge, or their non-appearance at the usual period, in spring, for instance, may cause the most serious consequences, such as apoplexy, pulmonary hæmorrhage, hematemesis, &c.

Causes. Among the *predisposing* causes of piles may be enumerated general plethora, whether natural or induced by luxurious living; the melancholic temperament, in which the venous circulation is torpid; a varicose habit; abdominal plethora induced by sluggishness of the liver, or deficient excretion from the mucous surface; and obstruction to the venous circulation in the abdomen, caused by occupations in which there is but little play of the abdominal muscles, or by the presence of adipose accumulations, tumours, or the gravid uterus.

2. The *exciting* causes are, the accumulation of fæces in the lower part of the colon pressing upon the mesenteric veins; the determination of blood to the arteries of the rectum from the operation of drastic cathartics (some accuse aloes particularly), or by sitting upon a damp seat, or by the use of the hip-bath, or pediluvium. The congestion may be sympathetic with, or vicarious of, the menstrual discharge.

Hæmorrhoids are most common in middle and advanced age, and more frequent in women than in men; partly on account of pregnancy, and partly from the obstructions of the catamenia, for which, as we have just remarked, hæmorrhoids are apt to be substituted.

Treatment. The indications are, 1, to remove the cause still in operation; 2, to reduce or remove tumours; 3, to alleviate the local symptoms; and, 4, to prevent the recurrence of the disease.

To the first indication belong general blood-letting, cupping over the sacrum, and laxative medicines. The two first of these are required only when there is general plethora, or great determination to the rectum, consequent upon the suppression of other discharges. The particular use of laxatives is to get rid of accumulations in the colon, and by exciting the secretions in the upper part of the canal, to set free the portal circulation. Castor oil, to which oil of turpentine may be added, if there is much hæmorrhage, manna, sulphur, and senna, are the most eligible. Electuaries containing Bitartrate of Potash, Sulphur and Confect. Sennæ, are extensively employed in hæmorrhoidal affections. The addition of Pepper, or of the Confec. Pip. Nigri is very useful when there

is no active inflammation. It may act by stimulating the torpid vessels of the rectum. We concur with Dr. Burne (*Cyc. of Pr. Med.*) in reprobating the habitual use of warm laxative enemata: they are injurious by relaxing and soliciting blood to the diseased part.

2. The most direct measure for removing the temporary turgescence, is the application of leeches to the anus, but not to the tumours themselves. The relief is considerable at the time, but seldom permanent; and frequent applications absolutely do harm by attracting blood to the rectum. One application, however, accompanied by proper laxatives and the recumbent posture, will often remove the attack.

The tumours have sometimes been punctured with great benefit, but the practice is dangerous, unless a needle only is used. If the tumour feels hard, or doughy, and has a thin covering, and if it is one of the species described above, as thin cysts containing coagula, it is very desirable to evacuate the contents. When the hæmorrhoids are permanent tumours, the mode of treatment becomes a surgical question. We have known great benefit from the assiduous use of Ung. Hydr. Nitr. properly diluted. But in many cases their extirpation is called for, if it can be practised with safety. The choice of the ligature or the knife is often a matter of nicety. When the piles are quite beyond the verge of the anus, the excision is preferred. The erectile tumours are best managed by ligatures, but the varicose are the most difficult to deal with. Excision often endangers the patient by hæmorrhage. When there is but little bleeding we may be sure that the venous peduncle was all but obliterated, but it is nearly impossible to ascertain this with certainty *à priori*. On the other hand the ligature may produce phlebitis, peritonitis, or severe disturbance of the nervous system. Where there is much doubt we should prefer the use of palliatives to making any attempt at extirpation. For more particular information on these points, however, we must refer to works on Surgery, particularly to Sir B. Brodie's Lectures. (*Med. Gaz.* vol. xv.)

3. For the relief of local uneasiness, tenesmus, itching, &c., we may direct the use of warm or tepid fomentations, a sponge dipped in an aqueous solution of opium, or henbane, or in poppy decoction, and tepid lotions of acetate of lead. The application of steam by sitting over hot water is a favourite popular remedy, but should not be very often resorted to. Ointments made by rubbing down lard with Liq. Plumb. and Liq. Op. Sed. or Extr. of Henbane, are soothing applications. In chronic cases astringent ointments, as Ung. Gall. and Ung. Zinc., lotions of Sulph. Zinc., Inf. Gall. and Dec. Querc., do good by diminishing the relaxation of the surrounding tissues.

4. The preventive treatment consists in attending to diet, in maintaining the action of the bowels, in taking regular exercise, in avoiding causes of irritation, and in giving tone to the circulation in the rectum. The last of these objects may be attained by sponging with cold salt water night and morning, and the use of a cold water enema just after a stool. Where there is much relaxation of the anus, with tendency to prolapsus, pressure is most advantageous, even though tumours exist; indeed, we have known tumours disappear under the employment of it, either by a spring pad or by a bandage, as recommended under the treatment of simple hæmorrhois. A bougie is sometimes useful on the same principle. Whether horse exercise acts in this manner, or by putting the perinæal integuments on the stretch, we do not presume to determine; but its utility is unquestionable.

Lastly, we must remark that no affections are more commonly mistreated than hæmorrhoids, in consequence of resorting at once to empirical methods, instead of first investigating the pathology of the individual case. This error is sometimes due to the carelessness of the practitioner in treating in an off-hand manner a very common, and often trivial complaint, but not unfrequently the fault lies more in the reserve and bashfulness of the patient.

SPASMODIC STRICTURE OF THE RECTUM.

Symptoms.—Causes.—Diagnosis.—Treatment.

In this complaint the patient suffers from constipation, and extreme difficulty in passing the evacuations. The stools are sometimes in the form of small cylinders, sometimes flattened like tape, and at other times consist of small nodules or pellets. Just before and during defæcation, there is often a sense of constriction in the lower part of the abdomen. The patient's feelings give the impression of some mechanical obstacle, which is confirmed by the appearance of the stools. These symptoms may continue for years, without improvement, or with short intervals of amendment, and then subside spontaneously. It is most important to diagnosticate such cases from those in which there is a permanent stricture, whether from inflammatory thickening of the submucous tissue, or from carcinomatous deposit. The symptoms are in many respects identical, but the appropriate treatment is very different.

Spasmodic stricture affects persons of the neurotic diathesis, particularly those subject to hysteria, hypochondriasis, and dyspepsia. The exciting causes are sometimes in the bowels themselves, particularly deficiency or vitiation of the bilious and mucous secretions. Irritation of the mucous membrane, whether inflammatory or nervous, may have the same effect. But frequently the disorder is only a part of a general deranged state of the nervous functions, and alternates with neurotic affections in other parts, or is provoked by causes acting directly on the nervous system, more especially by mental emotions.

The spasm or irregular contraction of the muscular fibres is caused either by a change in its natural stimulus (the feculent matter), or by a disturbance of the nervous apparatus which regulates the contraction. In some cases the extremities of the nerves are unduly irritable, as when the mucous membrane is inflamed, or even without this complication. In others the spinal marrow appears to be the seat of an irritation which disturbs the reflex function. The pathology of this affection is analogous to that of spasm of the bladder, and of the œsophagus, and often co-exists, or alternates with these disorders.

The *diagnosis* can sometimes be determined by an examination ; thus a bougie may pass up to the sigmoid flexure without any impediment, though unfortunately this is not always the case, the foreign body provoking the contraction which it seems to detect. We must then rely on the habit of the patient, the diseases which have previously existed, the age, the general health, and a careful examination of the stools.

Thus *permanent* stricture is very uncommon before the decline of life, or at all events before middle age, and, when of a carcinomatous nature, is accompanied by marked signs in the complexion and general health,—and generally by lancinating pains, and discharge from the part ; whereas spasmodic stricture occurs at any time after puberty, and without any appearance of cachexia. The patient in the latter complaint, if a female, has had amenorrhœa, or menorrhagia, or suffers from globus hystericus, palpitation, hysterical vomiting, dysuria, &c., &c., or if of the other sex, he has been what is called " a martyr to indigestion," and is over-attentive to all his bodily ailments. If we can obtain a sight of the evacuations, when the patient's attention has been diverted from the alvine function by some new and more urgent distress, we shall often discover that scybala have been voided of sufficient bulk to enable us to dismiss the apprehension of mechanical impediment ; notwithstanding the patients or the attendants may assure us that there is not room for a bougie of the size of a goose-quill. In many

cases we can only ascertain the true nature of the affection, by putting a number of slight circumstances together, and viewing their aggregate evidence against the one view or the other.

The *treatment* of spasmodic stricture consists, first, in preventing irritation from the contents of the bowels, by the use of a mild unoffending diet, and of alterative and laxative medicines : 2dly, in diminishing the spasm by anodynes and nervines, such as opiate and fetid enemata ; 3dly, in imparting tone to the bowel by cold injections, cold affusion over the loins, and the cold hip-bath ; 4thly, in removing spinal irritation by leeches in small numbers, by blisters, rubefacient liniments, or frictions with croton oil ; 5thly, in diminishing the general susceptibility by tonics (particularly chalybeates, which may be combined with aperients), by the shower-bath, and regular exercise in the open air ; 6thly, in attending to the catamenial function ; and lastly, in procuring regular occupation, especially such as may divert the mind from the local ailment. A strong moral impression will sometimes supersede every other agent. We shall relate an instance of this, which fell under our own notice. Our opinion was requested upon the treatment of a young lady, who was considered by her relatives and herself to be afflicted with an incurable stricture of the rectum, and who had been under medical care in another part of the country. She was of a highly excitable temperament ; her age was twenty, and she had been ill for more than a twelvemonth. Her malady, in the first instance, had been treated as if dependent on a chronically inflamed, and then obstinately torpid and congested liver. The remedial measures employed were venesection, cupping over the hypochondrium, leeching, blistering, and mercurial salivation ; notwithstanding all which, the young lady became worse rather than better. It was then suspected that some mischief existed in the rectum ; and to ascertain this fact a female, supposed to be experienced in such matters, was directed to make an examination, and upon her report, the case was pronounced to be organic stricture. The regular use of the bougie was now recommended, but no rectum-bougie could be made to pass the stricture ; whereupon some moderate sized urethra-bougies were used, but with great pain and difficulty. These were shown to us as proofs of the mechanical obstacle ; and we furthermore learned that the young lady often suffered from palpitation, headaches, and breathlessness, for which it had been advised that she should be occasionally bled, by way of equalizing the circulation, while the liver was to be kept up to its duty by occasional doses of calomel. The bowels were opened by enemata.

After a careful examination of the case we stated our inability to discover proofs of any thing but aggravated hysteria. We advised the bougies to be laid aside, much to the astonishment and doubt of the relatives, and to the relief of the patient, who had suffered greatly from their introduction ; and we advised the use of tonics, sedatives, laxatives, and a bracing regimen. The patient was gradually improving, with occasional fluctuations (in the course of which we had an opportunity of observing, more than once, that a rectum through which such evacuations could pass, as were submitted to our notice, was quite capacious enough for its ordinary function,) when the cure was suddenly taken out of our hands. We called one morning as usual, and instead of finding the young lady stretched upon the couch, afflicted with tremors, palpitation, throbbing pains, and a thousand other ills, we saw her advance to meet us with all the appearance of a person in health. She informed us that, on the previous evening she had had a long and interesting conversation with a gentleman who had recently arrived from the metropolis, where he had witnessed some astonishing effects of miraculous agency in the removal of incurable maladies ; and that he had encouraged her to expect a similar display of supernatural power in her own case. She lay awake a great part of the night meditating upon what she had heard, and in the morning assured her mother that she could leave her bed without help, and that she was quite restored. From that time she was perfectly independent of medical aid till some months afterwards, when the hysteria appeared

in a different form. The cure of the case might be explained in two ways; either by supposing that the powerful impression upon her mind had subverted the morbid condition of the nervous system, of which we may see examples almost every day; or that the evils had been principally simulated; and that a convenient opportunity was chosen for resuming the aspect of health. From our knowledge of the patient's character we entertain the former opinion.

In Mr. Mayo's *Outlines of Pathology* there is a very instructive case related by the patient himself,—a physician. He got rid of his complaint after long years of suffering, by abstaining from purgatives and using a restricted diet.

COLIC.

Symptoms.—Anatomical characters.—Nature.—Varieties.—Prognosis.—Treatment.

As there are no fixed anatomical characters of this disease, we shall speak, first of the symptoms, and afterwards of the pathological states, with which they have been observed or supposed to be connected.

Pain of the belly, especially of the umbilicus, of a twisting character, occurring in paroxysms, and generally relieved by pressure; constipation; and often nausea and vomiting, are the early symptoms. They may subside after the use of a strong purgative, or increase in severity. The pain then becomes more fixed, and is aggravated by pressure; the constipation continues; and the vomiting is so urgent that even the contents of the intestines are forced into the stomach, and discharged by the mouth. Hiccough, prostration, and cold sweats belong to this group of symptoms, which are distinguished by the term *Ileus* or *Iliac Passion*.

The pulse at the commencement of the attack is generally slow or of natural frequency, but it may become accelerated in the progress of the disease, and is then accompanied by febrile heat. This however depends chiefly on the fact of its being complicated or not with inflammation. The abdominal parietes are in some cases rigidly contracted, in others distended, and in others again gathered up into knots, so as to give (in the words of Cullen), "the appearance of a bag of round balls."

The duration of the disease may extend from a day or two, to two or even three weeks.

Anatomical characters. Persons seldom die in mere *colic*, so that the actual condition of the bowels is a matter of inference only. The morbid appearance of *Ileus* may be arranged under two heads, 1, lesions with mechanical obstruction; 2, lesions without mechanical obstruction.

1. In the first category may be placed, (*a*) Contraction of the bowel from former disease of its parietes.—(*b*) The stoppage caused by a large gall-stone or intestinal concretion, impacted in the small intestines.—(*c*) Intus-susception, or invagination, that is, the reception of one part of the intestine into the other, in such a manner that, on examining the part from within outwards, we find first two serous, and then two mucous surfaces in contact, and three concentric cylinders. This change is owing to a derangement of the regular peristaltic action, by which one part of the canal remains dilated, while that immediately above contracts, and by its propulsive movement is forced into the expanded portion. This state would not be attended with serious inconvenience, but for the spasmodic constriction of the recipient intestines, which strangulates that which is contained.—(*d*) Internal hernia, caused by entanglement of the intestine in preternatural openings of the diaphragm, the omentum, or the mesentery; by bands of false membrane between the intestine and other viscera, or partial

adhesions of convolutions forming loops, in which other convolutions may be ensnared; by a preternatural length of the vermiform appendage of the cæcum, which becomes twisted round a portion of the ileum, and adherent by what is usually its free extremity; or by a preternatural appendage to the ileum itself, called *diverticulum ilei*, of which we possess a remarkable specimen taken from a boy whose death it occasioned by entangling several inches of ileum in a tight knot.—(*e*) The pressure of a tumour external to the intestine, of which we have observed two instances; one a tuberculous accretion in the omentum, the other a fibrous tumour of the uterus.

2. The second class comprehends a great variety of cases. The most numerous of which are those in which a portion of the intestine is distended and inflamed, the inflamed part being of a dark red colour, or quite gangrenous, with or without exudations of coagulable lymph, according as the inflammation has extended to the peritoneum, or been confined to the muscular coat. The appearance in such cases bear a close resemblance to those of common hernia, when the bowel, though liberated, has not recovered the injury it received from the compression. They are sometimes found in connexion with old adhesions, which however may not have caused any direct mechanical impediment, but only interfered in some manner with the regular action of the canal. We confess that in all the cases of this group, there is great obscurity as to the production of the mischief; as it is not easy to understand the beginning of the inflammation in the muscular coat, a structure by no means liable to spontaneous disease of this kind, while the appearances are more like those of congestion from some impediment to the return of blood from the part. So much is this the case, that were it not for the great extent of the diseased portion in some instances, we should surmise that a temporary cause of strangulation had existed, such as an invagination which had been spontaneously reduced. But in another set of cases, wrapped in still deeper obscurity, the only morbid appearance has been an unusual degree of distension in some part of the tract. Such cases have not fallen under our own observation, but Dr. Abercrombie has related the particulars of two. One of them was a young woman who died after an illness of nine days, presenting the usual symptoms of ileus. The following is an account of the inspection:—" The whole of the colon, and about twelve inches of the lower extremity of the ileum were empty, contracted, of a white colour, and seemed perfectly healthy. The remainder of the small intestine was distended to the greatest degree, so as to appear thin and transparent; its contents were chiefly watery matter and air. On the surface of the distended intestine there was on several places, especially at the lower part, near the contracted portion, a superficial blush of vivid redness, but without any appearance of exudation. There was a small abscess in the left ovarium. All the other parts were healthy. (*Diseases of the Stomach, &c.*, p. 110.)

We conclude our account of the morbid appearances in ileus, by remarking that in many cases portions of the intestine present a cordlike contraction, just below the inflamed and distended part.

Nature. In all cases of ileus the propulsion of the intestinal matter is obstructed. In some, as we have seen, the obstacle is of a mechanical nature, and about these there can be no difference of opinion. But, as in others the passage of the canal is observed after death to be quite free, it is obvious that the obstruction must have been caused by some derangement or deficiency in the action of the muscular coat of the intestine. Upon the nature of this disorder two opinions are maintained. According to one, the intestine contracts spasmodically in some part so as to resist the passage of the contents, while the other supposes simply a loss of muscular power in some part of the canal, which prevents it from taking a share in the propulsive action. The former is the more prevalent belief, and is grounded upon the character of the symptoms, and the exciting causes, as well as upon the nature of the remedies. Dr. Abercrombie was the first to broach, and is the principal advocate of the other

opinion, which appears to have been inferred from a consideration of certain peculiar cases already alluded to. He regards the notion of spasm as altogether gratuitous, and sees no necessity for looking further than that condition of the diseased part which is found after death. He admits, however, " that there may be irregular contractions of portions of the intestine, analogous to that to which the term spasm is usually applied, and that these may form the first step in that chain of derangement of the harmonious action of the canal which leads to an attack of ileus." He then adds, " the observations now made strictly apply to the condition of the parts in the fully formed or advanced state of the disease."

Upon two points we concur with this distinguished author :—1. That the diseased part of the canal is paralysed, and that upon this depended the obstruction in the latter stage of the illness. 2. That the contraction of the gut does not necessarily indicate disease ; for we believe it to be owing to the smaller quantity of gas contained in the part, the principal accumulation of air being in the part where least resistance was offered, viz., that which had lost its contractility. But we submit that the error in Dr. Abercrombie's theory is laying an undue stress upon what appears to be only the termination of the disease. The true pathology of fatal ileus must in our judgment, embrace both spasm and paralysis. The reasons for inferring the former have been already alluded to, to which we may add the signs of inflammation in many of the cases, for it would be contrary to all analogy to suppose that inflammation attacks the muscular fibres, or even their contiguous tissues, without producing spasm. We see this accompaniment in rheumatism generally, in the intercostal muscles, in pleuritis, and in the diaphragm in pericarditis. But muscles which have been thrown into spasm by inflammation, in the progress of the disease become paralysed, of which we have also proofs in the instances just adduced. As to the cases which present no appearance of inflammation, we cannot doubt that spasm existed at the commencement of the attack, though in its progress the contractibility was destroyed.

Varieties. Several forms have been distinguished by nosologists, but we do not think it worth while to notice more than the following :—1. Spasmodic colic, which is common in hysterical, dyspeptic, and gouty subjects. This is often accompanied by flatulence, and tympanites, and may be brought on by mental agitation, or by cold applied to the extremities. 2. Colic from crudities or from scybala, including the *C. accidentalis* and *C. stercorea* of Cullen, and the *Colique végétale* of French authors. 3. Lead colic, which will receive a separate consideration. 4. Inflammatory colic, or muscular enteritis. 5. Colic from mechanical obstruction.

The *prognosis* will depend mainly upon the opinion formed of the cause of the attack. If it can be traced to acrid ingesta, neglect of the bowels, mental agitation, &c., and if it is soon followed up by appropriate remedies a favourable issue may be expected. But if no such causes can be ascertained, if the constipation continues notwithstanding the use of active medicines, and especially if the vomiting becomes stercoraceous, the case is one of extreme danger. Hiccough, tympanites, coldness of the surface, and a small rapid pulse, are among the most alarming symptoms. But patients sometimes recover from the most apparently hopeless forms of ileus. Dr. Kidd once informed us of a case, in which stercoraceous vomiting continued fourteen days, and yet the patient was restored. Sometimes a fortunate termination is owing to sloughing of the invaginated intestine, which is discharged by stool. Dr. W. Thompson of Edinburgh has collected and analyzed a great number of these cases. (*Ed. Med. Jour.* for 1835 and 1837.) Dr. Howell of Clifton has in his possession a portion of the ileum, eighteen inches in length, with the mesentery attached to it, which had been evacuated in this manner. The patient died a year afterwards of another disease. The greatest length of discharged gut on record is forty inches.

Treatment. In the milder forms of colic, the best remedies are aperients combined with carminatives, antispasmodics, and sedatives. A dose of calomel, camphor, and extract of henbane, followed speedily by a draught composed of Dec. Alocs C., Inf. Senn. and Tinct. Jalap. or of other stimulating laxatives, will often put an end to the attack. The effect of such medicines may be aided by warm fomentations and large enemata. If the subject is strong or plethoric a bleeding from the arm will be a safe precaution against inflammation, and an excellent auxiliary to the antispasmodic and aperient measures. In cases complicated with hysteria, an assafœtida or turpentine injection should be resorted to. In all forms of the disease, when the pulse becomes quickened, or when tenderness is felt upon pressure, the constipation having lasted several hours, it will be expedient to abstract blood. Local depletion by leeches is often preferable to venesection.

In cases presenting at first the characters of simple colic, but passing into ileus, or assuming the severe form from the commencement, particularly in the violence of the tormina and the vomiting, we must first ascertain that the external hernia is not present. The management of this form of the disease is often very difficult, and will put in requisition all the resources and ingenuity of the practitioner. It is often manifest from the tormina, that the alimentary tube is making violent propulsive efforts, but that the impediment is too great to be thus overcome. In such cases it is questionable whether much good is to be attained by the use of purgatives ; and they certainly aggravate the sufferings of the patient. The indication is to remove the impediment, for which purpose antispasmodics are sometimes the most efficient means. The cases in which purgatives are most indicated are those produced by acrid ingesta, or feculent accumulations. Now as it cannot always be determined absolutely that such causes have not been in operation, we usually administer at the onset one active cathartic, and if it fails to remove the constipation we no longer attempt at this stage to force the passage, but take measures for reducing the spasmodic contraction, whether this be the principal cause or only an accompaniment of the obstruction. Calomel, in the dose of ten grains or a scruple, is an eligible medicine, because it often allays the vomiting. If the sickness is not very urgent we may administer a full dose of croton oil, two drops for instance in a pill. Soon after such a dose a large emollient clyster should be employed. If no satisfactory evacuation ensues, blood must be taken from the arm, with the view not only of combating what inflammation may exist, but also to induce that general relaxation which favours the operation of medicine. A full dose of opium given after the bleeding will, in many cases, promote the natural action of the bowels by allaying the tormina.

A warm bath may be used at this juncture with very good effect. If the case continues obstinate, our next resource must be an injection of tobacco. This powerful medicine requires great caution in the administration. The plan recommended by Dr. Abercrombie is the safest and most efficient ; it consists in *infusing* fifteen grains for ten minutes, in six ounces of boiling water, and injecting this infusion every hour till the characteristic effects of slight giddiness, faintness, and muscular relaxation are induced. The dose may sometimes be increased to twenty grains. The same physician has seen very good results from a small enema, containing two grains of tartar-emetic, given with the same view as the tobacco. Some practitioners are partial to the use of tobacco in the form of vapour. Others place their main reliance upon enemata, containing large quantities of Ol. Tereb. When copious enemata are used, it is better to pass a long tube into the sigmoid flexure of the colon, as there will be a much better chance of having the fluid retained a sufficient space of time for its proper action. Considerable quantities of warm water may be thrown up in this manner with very decided effect. There can be little doubt that the distension thus produced is the chief agent in the beneficial operation. One can imagine that even an intus-susception might be unfolded by powerful

distension of the lower part of the canal. On this principle may be explained the good effects which have been obtained from inflation of the colon by means of a tube affixed to a bellows.

Although we have not recommended the use of strong purgatives after the failure of an efficient dose at the commencement, we can add our testimony to that of Dr. Abercrombie in favour of gentle laxatives frequently repeated, especially of aloes and hyoscyamus. Small doses of Magn. Sulph. in Inf. Ros. may be given in the same manner. Linseed oil has been recommended in doses of half an ounce every hour or two, combined with a few drops of Ol. Anisi. In few cases we apprehend is the stomach likely to retain such a potion.

Affusions of cold water upon the abdomen have sometimes produced an immediate good effect. Crude mercury, or small shot, swallowed to the amount of two or three pounds, has in many cases been followed by a solution of the disease, but we have ourselves no experience of these remedies. Dr. Abercrombie speaks highly of large blisters applied to the abdomen ; while Dr. Copland prefers hot turpentine fomentation. The best method of employing the latter is that of wringing a flannel out in hot water and then sprinkling it with oil of turpentine.

In the advanced stage of the disease, when there is great prostration, wine and other stimulants should be freely exhibited. Vinum aloes may be chosen for its twofold operation. We think highly of the administration, under the same circumstances, of injections of quinine, to which a small opiate should be added. The principal use of such means is to gain time while a spontaneous process of cure is going on.

In no case is treatment to be abandoned in despair ; but when the constipation continues in spite of the measures which have been enumerated, more good is to be expected from the use of small doses of mercury than from any other remedy with which we are acquainted ; very protracted cases have begun to amend after this medicine had produced its characteristic effects upon the system. It is probable that in such instances the impediment was caused by thickening from inflammatory deposit.

In intussusception the abdomen has been incised, and the strangulation reduced by the finger, with a successful result. Before deciding upon so formidable an operation, there must be more certainty in the diagnosis than can usually be obtained. Dr. Copland gives the following summary of the diagnostic marks of this condition :—" The sudden invasion of the symptoms of severe colic or ileus after a violent straining at stool, and subsequently the constant desire to go to stool, attempts at evacuation being accompanied with violent tormina and tenesmus, and either unattended by evacuation, or followed by the discharge of a little bloody mucus, and these by symptoms of enteritis, are among the most constant concomitants of invagination. In some instances, also, the sudden occurrence of an elongated tumour, in addition to these symptoms, and before abdominal distension comes on, will further guide the opinion, particularly if the invagination be extensive, and situated in the cæcum or course of the colon."

We remember a case in which all these signs were present, but which after lasting several days gave way to the operation of a strong dose of croton oil, administered as a *dernier resort*.

LEAD COLIC.

Symptoms.—Nature.—Treatment.

THIS form of colic is otherwise designated as *Colica Pictorum* or *Painters'
Colic*, and *Devonshire Colic*, because workmen of this class are particularly
liable to it. The disease having once prevailed extensively in Poitou, it has
been called *Colica Pictonum*, just as in this country it has been known as
Devonshire colic. In both these localities the disease was owing to the impreg-
nation of wine and cider with lead, either purposely to correct their acidity, or
accidentally by the use of leaden vessels. The lead colic is well known among
plumbers, lead-miners, glaziers, potters, and manufacturers of white lead, &c.
It is probable that the lead enters the system chiefly by pulmonary absorption,
but not entirely, since it has been observed that workmen who are careful to
change their clothes, and practice frequent ablutions, are much more free than
others from the deleterious effects of their occupation. The disease may be
caused by water which has been kept in leaden cisterns, or which has passed
through pipes of this metal; but for the water to be impregnated by the metal
it must be deficient in certain salts, particularly the sulphates and phosphates,
which exert a protective action, by forming insoluble compounds between their
acids and the oxide of lead. (See *Christison on Poisons, and Taylor in Guy's
Hosp. Rep.*, No. vi.)

Symptoms. Many of the symptoms are common to this with other forms of
colic; but it has certain distinguishing characters. Thus the pain begins less
abruptly, being at first dull, and afterwards increasing in intensity, and it
generally extends to the back and the hypochondria. We may often at once
form a suspicion of the nature of the disease, by observing the tremulousness of
the hands, and the weakness of the carpal joint, called by workmen the *wrist
drop*. The patient generally suffers pains in the limbs as well as in the abdo-
men, and not unfrequently spasms of the respiratory muscles. The tongue is
usually flat, tremulous, and flabby, and face of a dingy hue, with a dejected or
anxious expression; some have observed even a yellowish tint. Dr. Burton has
lately drawn attention to the appearance of the gums, which are of a pale bluish-
gray colour, especially along their margin. The abdominal parietes are in
some cases tender, while in others the patient finds considerable relief in the
pressure of heavy weights. There is great variability, also, as to the abdominal
muscles; for the most part they are retracted about the umbilicus, but we have
often seen them distended. The stools when produced are at first hard, dry,
and knotty. Instead of constipation, diarrhœa has been observed; but this is
extremely rare. The sphincter ani is sometimes so obstinately closed as to pre-
vent the introduction of a clyster pipe. Fever is not a prominent symptom, and
is sometimes entirely absent, but we have very often found the pulse quick and
hard, and the skin hot.

The attack is sometimes accompanied by palpitation, and sensations like those
of *angina pectoris*, sometimes by severe headache, and frequently by pain shoot-
ing along the course of the genito-crural nerve.

The disease is seldom fatal of itself. Thus Andral states that out of 500
cases observed at the hospital "La Charité," only five were fatal. (*Pathol.
Interne*, t. i., p. 158.) But the patient, if the same pernicious cause is in
operation, may die eventually of apoplexy or epilepsy. Partial palsy, impair-
ment of digestion, atrophy of the muscles, and a debilitated condition of the
whole system, are some of the most common consequences.

Nature. Anatomy has as yet given little more than negative information as to the pathology or nature of lead colic. Andral relates five cases (*Clin. Med.*, t. iv., p. 486), in which no lesions could be detected in the intestines capable of explaining the symptoms. Louis observed a similar absence of morbid appearances, in one of the cases narrated in his memoir on sudden and unexpected deaths. (*Recherches, Anat. Path.*, p. 483.) The mucous membrane has been found unusually dry, corresponding to the character of the stools, but excepting this, there is no appearance that bears any relation to the symptoms. The prevalent opinion in the present day is that the disease is of a neuralgic nature. The wandering pains, and impaired action of the voluntary muscles, the occasional spasm of the organs of respiration, and the termination of the disease in convulsions, apoplexy, and palsy, intimate that the poison acts directly upon the nervous system, and more especially on the spinal marrow. There is an evident analogy between the state of the intestine and that of the muscles, for in both we observe pain, together with spasmodic or deficient contraction.

The *treatment* is in most respects similar to that of the other species of colic. The chief indications are to relieve the pain and to procure a free action of the bowels. An opiate may be administered at the commencement, combined with calomel in a full dose; after which we must put in force many of the measures recommended in the last section, particularly the warm bath, turpentine or tobacco enemata, and the administration of croton and castor oil. There is not the same objection to beginning at once with strong cathartics as in some forms of ileus. The treatment pursued at La Charité is emetico-purgative; but though it appears to have been very successful, the plan usually adopted in this country of combining anodynes with the aperient remedies is preferable, because, while it is, to say the least, equal in efficiency to the other, it is attended with much less suffering.

Bleeding from the arm is very seldom requisite, but we often direct leeches to be applied, with great relief to the feeling, if not with any curative effect. We have observed the symptoms, though previously obstinate, give way under the specific action of mercury, but it will not be often needful to resort to this measure if other remedies are applied with sufficient promptitude. Sulphate of alumina in scruple doses is highly spoken of by some authors, but we have no experience of its virtues in this disease.

The treatment of lead colic at La Charité, by purgatives, baths, and opiates, scarcely ever fails, but it is most complex and troublesome to patient and physician. In this country the disease is generally treated by a dose of calomel and opium, say eight or ten grains of the former and two of the latter, which should be followed up by laxatives and opiates. The best laxatives are the infusions of senna, and castor oil: Dover's powders and opiate enemata are the best mode of administering anodynes.

Dr. Harlan of this city, who has had great experience in the treatment of the disorder, was extremely successful with the mercurial practice: he generally produced ptyalism, and the mercurial action seemed to be a counter agent to the pernicious effects of the lead: there is however, some inconvenience in this treatment, especially if the ptyalism should be severe.

G.

TORPOR OF THE COLON.

Nature. — Symptoms. — Causes. — Treatment.

THE state of the colon to which this term is applied, is one of deficient contractile power, by reason of which the fæcal matters are detained and accumu-

lated in the bowels. It is one of the most common forms of habitual constipation; but the mode of its production varies considerably.

In some persons this weakness of the colon is only a part of the asthenic condition of the whole system, such for instance as we meet with in persons exhausted by hæmorrhage, in aged subjects, and in chlorotic or leucorrhœal females. In others the deficient contraction depends upon causes more local in their operation. Thus it occurs very frequently in persons who, notwithstanding their indolent or luxurious habits, continue to consume the ordinary amount of food, and it may in such cases be traced to the accumulation which takes place in the bowel, from the want of that degree of support and compression which it is intended to receive from the abdominal muscles during bodily exercise. The colon like other hollow viscera becomes weakened by the long continuance of a distension disproportionate to its natural power. The indigestible nature of the food is another cause; for not having been reduced to a condition adapted to the natural irritability of the great intestine, it may either stimulate this part to unnatural hasty contractions, as in one of the forms of diarrhœa already described, or, what more commonly happens, it may produce no contraction at all. In the latter case the accumulation occurs principally in the caput cæcum. This form of constipation is often met with, as the consequence of eating large quantities of fruit and vegetables. But in another class of cases the fault is not so much in the food itself as in the processes to which it has been subjected in the upper parts of the tube. The insufficient chymifaction in gastritis and dyspepsia, the imperfect action of the duodenum, the deficiency or bad quality of the bile, will readily explain why the contents of the small intestine do not stimulate the colon to healthy action. But whether the fault lies in the quality of the food or in the digestive processes, the result is much the same. The feculent matter accumulates in the colon, because the latter is not duly excited to contraction; while the fibres lose their power, both from inaction, and from the distension to which they are subjected.

Torpor of the colon is sometimes connected with spinal irritation, but the influence of the latter is probably indirect through the intervention of the rectum, the spasmodic contraction of which occasions the retention of the contents of the colon. In many cases we believe the spinal disorder to be consequent rather than antecedent. When the medulla spinalis is paralysed, the colon is very often involved in the paralysis.

Symptoms. Constipation is the most prominent of the local signs, but to this we may add tympanites, borborygmi, and stridulous sounds. The appetite is defective or perverted, and the digestion in most cases tardy and accompanied with uneasy sensations. The tongue is generally pale, sodden, puffed, and indented along its margin, the breath fetid, the skin damp and chilly, the urine turbid and dull, the complexion pasty or of a dingy hue, the areolæ round, the eyelids dark, and the expression of the countenance oppressed or anxious. There are sympathetic pains in the head and loins, but especially in the latter, and to such a degree as to simulate lumbago or nephralgia, aching sensations in the limbs, shooting pains in the region of the bladder and genital organs, palpitation and dyspnœa.

The evil consequences in other parts of the system are manifold. If the torpor of the colon is primary, it can scarcely fail for very obvious reasons to involve disturbance of the stomach and duodenum. The accumulations may be mechanically injurious; thus by making pressure on the biliary duct, they may occasion jaundice; and in like manner by compressing the mesenteric veins they produce hæmorrhoids. It has been thought by some that apoplexy may result from their pressure upon the abdominal aorta; and there can be little doubt that the œdema of the feet in young women suffering from this affection, may be sometimes accounted for by the impeded circulation in the inferior vena cava. The disease is often connected with amenorrhœa, but whether in

the relation of cause, or as an associated effect of an antecedent common to both, is not quite evident.

The prognosis is by no means unfavourable when the disease is fully ascertained, but this is often more easy to cure than to recognise.

Treatment. The first indication is to disburthen the colon of accumulations already formed. For this purpose we may use conjointly cathartics by the mouth, and enemata. The latter may consist of thin gruel, with castor oil and oil of turpentine; or of Epsom salts dissolved in infusion of senna, in the proportion of one or two ounces of the former to half a pint of the latter, to which a pint of warm water should be added. In obstinate cases, the enema colocynthidis is a good resource. When the injections return without bringing scybala with them, we have directed the injection of a large quantity of warm water through a long tube passed into the sigmoid flexure of the colon, in the manner recommended by Dr. O'Beirne. (*New Views of Defœcation, &c.*)

The purgative medicines which we have found most efficient in these cases, are Dec. Aloes Comp., with Inf. Senn. and Tr. Jalap.: the Pil. Cambog. Co.; or equal parts of this pill and Ext. Col. Co.; or of the latter and Pil. Rh. Co.; taken twice daily. We may remark that when these combinations fail to produce any effect, which is not a very unfrequent occurrence, there is reason to suspect that the drugs are of bad quality. The purgatives should be continued till the motions are of a natural appearance and devoid of scybala.

2. We must next endeavour to remove or counteract those causes which have rendered the contents of the intestine less stimulating than they ought to be, whether in the food or in the imperfect functions of the stomach and duodenum. (See the treatment of DYSPEPSIA and DISORDERS OF THE DUODENUM.)

3. The third indication is to restore the tone of the colon. With this view we may exhibit laxative and tonic medicines in conjunction; for examples, a grain of quinine or of sulphate of iron with four of Pil. Alo. c. Myrrh twice or thrice daily; or the quinine may be given in solution with Magn. Sulph. in cinnamon water. We have found electuaries containing tartrate of iron very serviceable. Friction of the abdomen with liniments composed of camphor and turpentine, or with a flesh brush, or a flannel glove, after sponging with salt water, is an excellent auxiliary. Tepid or cold affusion of the loins, followed by brisk friction, is also useful. If there is spinal irritation, leeches or blisters must be applied over the lumbar vertebræ.

4. The diet must be such as will leave the smallest possible quantity of excrementitious product. Animal food may be used twice daily in most cases; but fruits, vegetables, preserves, *et id genus omne*, must be rigidly abstained from. Wine may be allowed as a part of the tonic regimen which this affection usually requires. Exercise either on foot or on horseback is indispensable. In addition to the local application of cold, already recommended, the use of the shower-bath will be expedient.

A very simple change of diet will often be more effectual than any medicinal substances. We have seen a number of cases which resisted medicines, cured by taking oatmeal porridge at breakfast: whenever dietetic treatment will succeed, it is much to be preferred to any other. G.

TYMPANITES.

Nature.—Complications.—Diagnosis.—Symptomatic tympanites.—Duration.—Treatment.

DISTENSION of the abdominal parietes by a large collection of air in the interior is called tympanites, or meteorismus. The latter term is restricted by some

writers to the symptomatic form of the disease, particularly that which occurs in fevers. Cullen and other nosologists distinguish tympanites as caused by accumulation of air in the intestine (*T. intestinalis*) from that form in which the air is contained in the peritoneal sac (*T. abdominalis*). But the latter is allowed by all observers to be extremely rare, excepting as the consequence of perforation of the intestine, or of disorganization of the peritoneum.

Intestinal tympanites is very common, both as an acute and as a chronic affection. The acute form is generally an accompaniment of other diseases, the chief of which are peritonitis, colic, and typhoid fever. We have known it take the place of an autumnal diarrhœa. Chronic tympanites, though frequently an attendant on other diseases, especially peritonitis, may be the only complaint of its subject, and in this form it has been mistaken for many other species of abdominal intumescence, including the gravid uterus.

Diagnosis. Tympanites may be distinguished from solid or liquid distension by the clear resonance which percussion elicits. It may be further distinguished from ascites, by the absence of fluctuation, and by the equable distension of the parietes, which is not altered by position. There can be little doubt that the colon is the most frequent seat of the accumulation in chronic tympanites. When the distension of this bowel is moderate or confined to one part, it is apt to be mistaken for solid tumours. We have observed the abdomen assume a pyriform shape not unlike the protuberance of pregnancy; in such cases the clearness on percussion will be more perceptible in the circumference than in the centre of the abdomen. Distension of the cæcum and ascending colon has often been mistaken for hepatic or other visceral enlargements. Constipation is commonly an attendant of tympanites, but in fever and mucous enteritis it may coexist with diarrhœa.

The pathology of symptomatic tympanites varies according to the nature of the disease which it accompanies. In some forms of colic, the accumulation of gas takes place together with that of the fæcal matters, and from the same cause, viz., the want of propulsion. In the flatulent and hysterical varieties of colic more gas is formed than in the natural condition. The tympanites of fever and of peritonitis may be traced to the loss of contractility in the muscular fibres, consequent on inflammation of the mucous or serous coat. The cause of chronic idiopathic tympanites is generally a want of tone in the muscular fibres.

That accumulation of gas, which depends on its inordinate quantity, may be sometimes accounted for by the imperfect digestion of vegetable matter, and its consequent fermentation. The enormous amount of gas evolved by this process is well known; but in other cases we cannot explain its production in this manner. Thus the suddenness of the affection, its excitement by mental emotion, and its substitution for diarrhœa, show that it must be referred to direct secretion.*

The duration of the chronic disease is indefinite. We have known it last for several years in hysterical women; subject, however, to changes in degree, and sometimes alternating with other manifestations of their Proteiform malady.

Treatment. The tympanites accompanying inflammatory affections scarcely calls for special remedies. In fever, however, it sometimes becomes so prominent a symptom as to need separate attention. If it is not removed by leeching and blistering, we may administer the oil of turpentine in drachm doses, either with castor oil, or in an emulsion with magnesia, mucilage, and aromatic water. The tympanites of flatulent colic must be combated by carminatives, aperients, and stimulating embrocations. The chronic form of the complaint is a great trial of the resources and patience of the practitioner. His chief object must be not only to stimulate the bowel to contractions sufficient for the expulsion of the wind, but also to restore its tone. In pursuance of the first indication we may resort to turpentine, camphor, the fetid gums, carminatives, frequent frictions

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* On this subject we beg to refer to the Pathological Introduction.

of the abdomen, and the use of galvanism. For the more permanent effect, aperients combined with tonic medicines are mostly to be depended upon. Sydenham employed with great success an electuary of iron filings and bitter extracts. We can recommend a combination of sulphate of iron, sulphate of quinine, compound galbanum pill, and powder of capsicum. In an obstinate case we obtained some benefit from strychnia, in the dose of one-twelfth gradually increased to one-eighth of a grain. Injections of quinine and sulphate of zinc may be employed, when a change of remedies seems desirable. Sometimes we have depended upon the application of cold water in the form of effusion, or of enemata. The support of an elastic belt or of a flannel roller will assist the cure. The artificial removal of the air by means of the tube of a stomach pump passed into the colon has been judiciously practised by Dr. Osborne of Dublin, on the same principle as that of frequently evacuating an atonic urinary bladder by the catheter; for in the latter case, it is well known that the fibres seldom recover their contractility so long as they are subject to distension from a large quantity of fluid.

PERITONITIS.

General observations.—Anatomical characters.—Symptoms.—Diagnosis.—Causes.—Prognosis.—Treatment.—Erythematic Peritonitis.—Puerperal Peritonitis.—Peritonitis from intestinal perforation.—Symptoms and treatment.—Chronic Peritonitis.—Anatomical characters. — Tuberculous complications. — Symptoms. — Latency. — Causes. — Prognosis.— Treatment.—Peritonitis of the Cæcum.—Symptoms.—Termination.—Treatment.

As the peritoneum invests other organs than those which are the particular objects of present consideration, it may seem to be out of our province to treat of inflammation of this membrane generally. It cannot be questioned that disease may affect separately a portion of the peritoneum, which has no other connexion with the alimentary canal than that of the continuity of a serous tissue; for example, the convex surface of the liver; but with the exception of this, and perhaps some parts of the coverings of the uterus, its appendages, and the bladder (which are not necessarily though very often accidentally in contact with the intestinal tube), there are no other inflexions of the peritoneum liable to be attacked by inflammation, without extension of the disease to the serous coat of some part of the alimentary tube; a fact easily explained, when we consider that the serous covering of every organ, but those which have been just adverted to, is in contact with some portion of the gastro-enteric surface. The effect of contact in propagating serous inflammation is more obvious than even that of continuity. Hence it is rare to find marks of inflammation on a part of the peritoneum without a corresponding appearance on the opposite surface; and, conversely, we often observe a limitation of the disease to the two surfaces which were in contact when the inflammation began in one of them; as for instance, between two convolutions of intestine; between these and the omentum; between the uterus and rectum; and still more strikingly between the upper surface of the liver and parietal membrane, without extension to the under surface; and again, between the ascending colon and the concave surface of the liver, without extension to the convex. At first sight we may consider it difficult to explain this communication of morbid action to an opposite surface, and may even fancy it needful to call in the aid of some such agent as electricity. But there is no necessity for such a notion, if we consider the actual condition of the inflamed membrane, which is hotter than natural, at first dry, and afterwards bedewed with inflammatory serum, or roughened by fibrinous

deposit. The application of such a surface to the opposite serous membrane cannot fail to irritate the latter, and to produce a morbid action, which will be of the same kind, because the organization of the two parts is identical.

Anatomical characters. Redness is far less subject to exception, as a sign of serous than of mucous inflammation, which might have been inferred *à priori* from the opinion of the organization of the tissues, and in the agencies to which they are subjected. There is no danger of confounding the dull cadaveric redness on the outer surface of those folds of intestines, which lie in the most dependent situations, with the vivid inflammatory injection in parts least liable to hypostatic congestion. But if the colour could mislead us, we have the means of correcting our judgment in the absence of inflammatory products. On a mucous surface an additional quantity of the proper secretion, or a serous or fibrinous effusion, may easily escape our notice, but this cannot occur in the shut sac of a serous membrane.

One of the most common appearances on turning aside the parietes, is an adhesion of the great omentum to the inferior folds of intestine, or even to the pelvic organs; the raising of this membrane discovers the convolutions beneath inflated, agglutinated by soft albuminous exudations, and suffused, on their anterior surface, with a bright vermilion tint. On separating the folds we find, according to the period and character of the inflammation, serum clear or milky, sero-purulent fluid, and actual pus, in the interspaces. These liquids are found in still greater quantity in the iliac and pelvic fossæ. The collections of pus among the adherent folds appear like small abscesses. The organization of the false membranes depends partly on the time which has elapsed since the commencement of the inflammation, and partly on the type of the inflammation and the constitution of the individual. In some cases there is very little tendency to organization, though the inflammation has lasted several days; in others the matter is so plastic that blood-vessels have been detected in it after a few hours. The colour of the fibrinous deposit is sometimes a yellowish-green; more commonly a dull white.

Peritonitis may be universal or partial. The inflammation is oftener limited in situations where there is but little motion between the opposite surfaces, and consequently little change of contact, and *vice versâ.* Hence it is more diffused over the small intestine, but circumscribed in the neighbourhood of the cæcum, the liver, the spleen, and the uterus.

Gangrene and ulceration from acute peritonitis are very rare.

Symptoms. An attack of this disease is sometimes preceded by chilliness, rigors, and a feeling of indisposition, but frequently it comes on abruptly, with acute pain in some part of the abdomen, generally in the hypogastric or one of the iliac regions. The pain is aggravated by any movement of the body, which puts the abdominal muscles into play, particularly by coughing, sneezing, sighing, evacuation of the bladder, &c. Pressure is extremely distressing, and even the bed-clothes may be felt an incumbrance. The patient lies supine, and often with his knees drawn up, probably from an instinctive desire to relax the abdominal muscles, and to avoid the contact of the bed covering; but not unfrequently the great degree of weakness well accounts for this position. The belly is hot, tense, and for the most part, as the disease advances, tympanitic. The bowels, if not constipated at first, become so in the progress of the disease; and nausea and vomiting are frequent from the very commencement.

The skin is generally dry and hot, and the pulse rapid, small, and hard. The tongue has a white fur, the lips are dry, the cheeks pale and collapsed, and the eyes sunk, while the countenance indicates great physical distress and depression. To a practised eye the disease is distinguishable by the countenance only, even when the other characteristics are wanting.

Such is the ordinary display of symptoms in well-marked cases of peritonitis; but the disease is very apt to steal on insidiously, rather by the absence

of the usual phenomena, than by the assumption of characters significant of other maladies. We must allude to one or two variations of the symptoms.

The bowels may continue to act without impediment during the whole course of the disease : when this is the case, it must be inferred that the irritation has not extended as usual to the muscular coat, sufficiently to produce either spasmodic or paralytic obstruction. (See COLIC.) Vomiting under similar circumstances may not occur. The pulse, instead of rising to 120° or 130°, may keep as low as 80° or 90°, or even at its natural rate ; and the temperature of the skin may be scarcely at all elevated. After the consideration of these and other anomalies, Dr. Abercrombie is of opinion that our chief reliance for the diagnosis must be placed on the tenderness of the abdomen. This symptom, however, appears to us to be rather calculated to awaken suspicion of peritonitis in the absence of other signs, than sufficient for distinguishing it from other diseases ; since tenderness may exist in many cases where the peritoneum is not at all involved.

The effusion of coagulable lymph may be sometimes detected by an impression conveyed to the ear, and to the hand. Dr. Beatty of Dublin was the first who described the sign alluded to. (*Dub. Journ.*, vol. vi.) In a case of peritonitis supervening on ovarian dropsy, " a remarkable sensation was communicated to the hand, when applied over the umbilicus and its neighbourhood. The sensation was, that of a grating or rubbing together of two uneven or rather dry surfaces, and was rendered most evident by ordering the patient to take a full inspiration, thereby causing the abdominal parietes to move more freely over the surface of the tumour. By the application of the stethoscope a loud and distinct *frottement* was audible, extending over a space of about five inches in diameter, with the umbilicus for a centre." Dr. Bright subsequently published some similar observations in the *Med. Chir. Trans.*, vol. xix. He describes the feeling given to the hand as " varying between the crepitation produced by emphysema, and the sensation derived from bending new leather." Afterwards Dr. Corrigan investigated this subject (*Dub. Journ.*, vol. ix.), and adduced reasons for concluding that it is necessary to the production of the sign, that the effused lymph should be in an unorganized condition. Dr. Beatty was of opinion that the sign is observable only in cases " where one at least of the opposed surfaces is adherent to a solid resisting body." Although it does not appear that this condition is indispensable, the general correctness of Dr. Beatty's views is proved by the fact, that out of twelve cases collected into a tabular form by Dr. Stokes (*Dis. of the Chest*, p. 478), nine presented an organic tumour.

Diagnosis. 1, From *Enteritis*. We have confined this term to inflammation of the mucous coat of the intestines, which may generally be distinguished from that of the peritoneum by the tendency to diarrhœa, the slighter degree of pain and tenderness, the softer pulse, the absence of vomiting, and the redness at the tip and margin of the tongue. 2, From *Ileus*. In many cases of this affection, especially of that form accompanied by inflammation of the muscular coat, the enteritis of some authors, the diagnosis from peritonitis is impossible at a certain stage. The pain, tenderness, vomiting, constipation, distension, and fever are the same in both diseases, when fully formed ; but the mode of accession and the order of the symptoms are different. In Ileus the inflammatory symptoms are secondary to the obstruction, while in peritonitis they begin the attack, and take the lead throughout. 3, From *Hysteria*. This is by far the most important department of the diagnosis, in a practical point of view, because the treatment of the two affections is widely different. The hysterical imitation of peritonitis may often be detected by the superficial tenderness, which, although greatly excited by slight pressure, and even to a more intense degree than in peritonitis, is something alleviated by deeper pressure. Often a similar tenderness may be discovered on the chest and limbs, though not complained of by the patient. Pressure upon the lumbar vertebræ also elicits pain

in many cases of this description; but we cannot agree with Dr. Griffin in assigning as much importance as he appears to have done to this sign, as distinctive of neuralgic affections of the abdomen generally from peritonitis, though it is certainly a useful help when taken in connexion with other signs.   We have known it present in cases of acute inflammation of the mucous follicles. In many instances we must depend principally upon the history of the case, the expression of the countenance, the mental phenomena, the connexion with menstrual irregularities, the fugitive character of the symptoms, and the thousand anomalies appertaining to hysterical cases.

Causes.   An attack of peritonitis may be brought on by exposure to cold, more especially when the skin has been previously relaxed by a warm atmosphere, or by fatigue.   The disease is also known in connexion with such causes as mechanical injury of the abdomen, the state of the uterine system left by parturition, and the introduction of foreign matters into the serous cavity, as by perforation of the alimentary tube, bursting of hepatic abscess, rupture or ulceration of the biliary ducts, &c.   It has likewise been produced from metastasis of rheumatism.   (Andral, *Clin. Méd.*, t. iv. p. 535.)

Prognosis.   If the case is seen early enough for the application of remedies to the first stage, we may entertain fair hopes of recovery; but if the disease has been allowed to run on unchecked, if the abdomen has become tympanitic, if the vomiting and constipation are established, if the pulse is frequent and thready, and the strength prostrate, and especially if there is hiccough with cold perspiration, the danger is extreme.

It must not be hastily inferred from the mere returning action of the bowels that the malady is resolved; for we have known a state of general collapse ensue, in which the rectum and sphincter ani become relaxed and permit the escape of the fluid contents of the bowels, with any thing but an amendment in the condition of the patient.   This is a great disappointment to the friends of the sufferer, who fancy that the malady must cease with the obstruction.   A due attention to the accompanying symptoms will save the practitioner from the prognostic error alluded to.   The duration in fatal cases is various.   It may run its course in less than thirty-six hours; while in other cases the termination has been protracted to a fortnight or three weeks; but these are extreme periods, the average duration being from six to eight days.

Treatment.   From the moment that peritonitis is recognised, there is but one plain straightforward course to pursue, viz., to overcome the inflammation.   For this purpose our great dependence must be placed on general blood-letting. Dr. Abercrombie has some admirable observations on the employment of this measure which we cannot forbear quoting :—

" In all cases of active inflammation, blood-letting can be of comparatively little avail, unless it be used at an early period, and pushed to such an extent as to make a decided impression upon the system, as indicated by weakness of the pulse, paleness, and some degree of faintness : and a practice to which I am very partial in all urgent inflammatory cases, is to follow up this first full bleeding by small bleedings, at short intervals, when the effect of the first begins to subside.   In this manner we prolong, as it were, the impression which is made by the first bleeding, and a twofold advantage arises from the practice, namely, that the disease is checked at an early period, and that the quantity of blood lost is in the end much smaller than probably would be required under other circumstances.   If we allow the patient to lie after the first bleeding ten or twelve hours, or even a shorter period, the effect of it is entirely lost; and a repetition of it to the extent of twenty ounces may be required for producing that effect upon the disease, which, by the former method, might be produced by five; and besides, the disease has in the interval been gaining ground, its duration is protracted, and the result consequently rendered more uncertain. The inflammation of a vital organ should not be lost sight of above an hour or two at a time, until the force of it be decidedly broken, and unless this take

place within twenty-four hours, the termination must be considered as doubtful." (*Op. cit.* p. 173.)

Leeches should be applied to the most tender part of the abdomen, immediately after the first bleeding, and repeated frequently according to the obstinacy of the inflammation and the strength of the patient. Blisters should never be employed in the early period of the disease; they prevent our ascertaining the state of the parts by pressure, and are by no means desirable remedies until blood has been freely abstracted both locally and generally. In the advanced stage, when the abdomen has become tumid, and tympanitic with obtunded sensibility, when in fact there is reason to believe that lymph and serum have been freely secreted, a very large blister may effect a salutary revolution. The best external applications when the inflammation is active are warm poultices made of bran, but we must take care that they are not ponderous. In some cases hot turpentine fomentations have a good effect; while in others cold evaporating lotions have seemed preferable. The evaporation may be accelerated by blowing the surface with a common bellows. We have placed a patient in a warm bath, sufficiently long and shallow for him to lie extended, and for the tumid abdomen to rise above the level, so that we could pour a jet of cold water upon the latter. The relief to the feelings has been most striking, even when the disease was too far advanced for a cure.

Many practitioners are in the habit of administering strong purgatives in this disease. If such medicines are given, as we fear they too often are, for the purpose of removing the constipation, we think the practice, to say the least of it, very unphilosophical. The obstruction is but the effect not the cause of the inflammation, and will be removed with the latter. It is not wonderful that the patient and his friends should be importunate for medicines which they imagine would get rid of what they suppose to be the predominant mischief; but the practitioner ought never to give way to this prejudice, but on the contrary, to explain to them that the great object is to subdue the inflammation, and that the bowels will afterwards take care of themselves. This treatment, however, is not superfluous merely; it may be positively injurious, since by increasing the peristaltic action we put in motion the inflamed part, which on the contrary ought to have as much repose as possible. There is moreover the danger of tearing asunder recent adhesions, and thus producing additional irritation. We are of opinion, that there is only one principle upon which these medicines might be useful, viz., that of producing a strong revulsion to the mucous membrane. Could we be sure that the inflammation was in its first stage, such a plan of treatment might be adopted with comparative safety; and in cases which forbid the abstraction of blood, we might be tempted to use it, taking care to select those articles which have most of the hydragogue property.

Although we have thought it right to condemn the use of powerful cathartics, we see no objection to such mild laxatives as may keep up the usual secretions of the mucous membrane; for example, small doses of rhubarb, with hyoscyamus, or aloes and hyoscyamus; or perhaps still better, the tartrate of potash and soda, given at intervals in an effervescing form.

From the time the case first comes under treatment, mercury should be exhibited in such quantities as will bring the system under the full influence of this agent, should it become necessary to do so. We have often found reason to regret that the decisive administration of this remedy had been deferred until the treatment of blood-letting and other means had proved unsuccessful, and that in this way much valuable time had been lost; whereas if the mercury had been given at regular intervals from the commencement, a comparatively slight increase of the doses, or their more frequent repetition, would have effected our purpose; and on the other hand, if the disease had yielded to other means, we might have discontinued the use of it before the specific effects were developed. Experience has therefore long taught us to begin at once the employment of mercury in every case of acute inflammation, which may in its course require the

operation of this remedy, and not to wait till the necessity for it becomes mani-
fest.   Acting on this principle, we may in the treatment of peritonitis prescribe
calomel in doses of three grains every four hours, with half a grain or more of
opium, which will prevent irritation, and at the same time mitigate the pain.   If
the necessity for the medicine becomes more striking, we can administer the
calomel and opium at shorter intervals, or even in very urgent cases at the
same time introduce mercury by inunction.   When the gums become sore, we
may entertain a favourable opinion of the issue of the case.

The vomiting in this disease is often an embarrassing circumstance; but it
may be sometimes overcome by hydrocyanic acid or by creosote, and sinapisms
or hot laudanum fomentations applied to the epigastrium.   It is a great object
to quell this symptom, not only because of the distress and the augmentation
of pain which it occasions, but also because it interferes with the regular use of
remedies.

In the advanced stage of the disease, when all hope of succeeding by anti-
phlogistic measures is given up, we must endeavour to give nature a chance of
spontaneous cure, by supporting the strength.   For this purpose wine may be
taken freely, and quinine dissolved in beef tea may be injected into the colon.

It is generally a most unfavourable sign, when, notwithstanding the cessa-
tion of pain and tenderness, the bowels refuse to act, and the abdomen continues
distended.   Sometimes however these latter symptoms depend simply on the
loss of muscular tone, caused by the inflammation, though the latter has sub-
sided.   When this is the case, the state of the pulse and the temperature of the
body may give a more encouraging view; mild laxatives and assafœtida injec-
tions are useful under such circumstances.   The pulse, as Dr. Gooch observes,
is often the last thing to mend, continuing frequent long after the pain has ceased,
and the bowels have resumed their function.   For this symptom, which in many
cases may be attributed to the irritability induced by the loss of blood, digitalis
is the best remedy.

Erythematic or Non-plastic Peritonitis.

The peritoneum is liable to a form of inflammation which is accompanied by
fever of an adynamic character, and which terminates rapidly in the secretion
of serous fluid, generally white and milky, sometimes bloody, with scarcely
any intermixture of coagulable lymph.   When the latter substance is found, it
is in flakes, scarcely or not at all adhering to the membrane.   We have ob-
served this form of peritonitis in puerperal women, and Dr. Abercrombie relates
some interesting cases in which it attacked persons suffering from epidemic ery-
sipelas.

The progress of this disease is rapid, and the termination generally fatal.   The
local symptoms are not so acute as in the common peritonitis, the abdomen
being less painful and tender, and the bowels often freely open, but the powers
of the system are very soon depressed, and the pulse from the beginning is fre-
quent and feeble.

It is most probable that peritonitis of this nature is secondary to a febrile
affection of the whole system (perhaps a disorder of the blood), which may re-
sult from a peculiar condition of the atmosphere, or from the previous habits of
the individual, or from that state of the system which ensues upon parturition.
If the fever were only secondary to the inflammation it would be impossible to
account for the rapid termination of the disease, seeing that the local disorga-
nization is much less severe than in the usual form of peritonitis, and for the com-
parative uselessness of antiphlogistic remedies.

Scarcely any thing satisfactory can be said of the treatment; local deple-
tion affords some relief, without making any impression on the general condition,
for doing which indeed there is little time, whatever be the means adopted.   The

rapid introduction of mercury into the system, and maintaining the strength by wine and bark, appear to us to hold out the best prospect of success. After a single application of leeches the abdomen should be covered by a large blister.

Puerperal Peritonitis.

Women are liable to inflammation of the peritoneum when recovering from child-bearing. The usual time for its accession is about the third day, but it may occur much later. In many cases, especially when the disease is sporadic, it does not differ in its nature and characters from common acute peritonitis, excepting as to the symptoms depending on the peculiar circumstances of the patient; such as the suppression of the lochia, and of the milk, and the almost universal commencement of the pain and tenderness in the uterine region. This form of the malady may require the same activity of treatment as when it occurs in other subjects.

Puerperal females are also subject, as we have already stated, to the erythematic form of peritonitis.

Both these forms may occur epidemically, but especially the latter. The former must be viewed in connexion with the fever which accompanies it, if we wish to adopt an appropriate treatment. In sporadic cases the fever is generally active and inflammatory; but in the epidemic variety it assumes more or less of the typhoid type, and therefore the treatment must have reference to this. In some cases the peritonitis must be viewed merely as a complication of puerperal fever, holding the same relation to it as pneumonia, bronchitis, and enteritis to continued fever. But in other cases the inflammation may be primary, depending on the state of the uterus after delivery, such as uterine phlebitis, or inflammatory softening of the substance of the womb; and yet we may find the fever of a decidedly typhoid character, just as we may have a typhoid pleuritis or pneumonia. In both cases there pre-exists a certain state of the constitution, induced by the habits of the individual, or by an atmospheric miasma, which causes the fever to assume a typhoid form. (For an account of the peculiar characters and treatment of puerperal peritonitis, see PUERPERAL FEVERS.)

Peritonitis from Intestinal Perforation.

We think it better to offer in this place a few separate remarks to this subject, not only because the accession of the phenomena is peculiar, but also because a particular kind of treatment is requisite.

Perforation of the alimentary canal is commonly the result of ulceration, which may gradually erode all the coats, proceeding from the mucous to the serous; or when it has arrived at the latter, the solution of continuity may be finally caused by mechanical rupture. This rupture may be determined by the internal pressure of flatus, or of a large quantity of alimentary or fæcal matter; or by the sudden external pressure of the abdominal muscles in straining at stool, coughing, sneezing, &c. For the latter effect it is necessary that the tube should contain at the time a certain quantity of air, the compression of which by the abdominal muscles causes the accident in question. There is another mode in which this lesion may occur. The serous membrane at the base of the ulcer may be adherent to an adjoining fold of intestine, and during increased peristaltic contraction such force may be exerted upon the false membrane, as to tear away the thin partition between the ulcerated intestine and the peritoneal sac.

The ulcerations most frequently productive of this accident, are those which destroy the follicles in typhoid fever and in phthisis. Ulcers of the stomach

and duodenum also give rise to it; but they are more frequently guarded by adhesions to the adjoining viscera. (See ULCERATION OF THE STOMACH.) The opening is sometimes very minute.

The *symptoms* of intestinal perforation are very characteristic. Excruciating abdominal pain comes on suddenly, and generally in the ileo-cæcal region, accompanied with considerable tenderness on pressure, and painful micturition; this is soon followed by great frequency and feebleness of the pulse, collapse of the features, and other indications of sinking. The abrupt supervention of such symptoms in a case of ileo-colitis, typhoid fever, or phthisis, can scarcely fail to conduct the mind to the true pathology of the case. It is to be regretted that we are not also led to the means of cure. Peritonitis thus induced is nearly always fatal, partly because the exciting cause is not to be removed, and partly because the patient's condition, resulting from previous disease, is little fitted for struggling with so severe a lesion. The cure however must be attempted, and we have the encouragement of knowing that it has been occasionally though very rarely successful. Dr. Stokes records one case in which life was saved, and another in which the treatment adopted was manifestly useful. The plan adopted was one that had been previously employed with success by Dr. Graves, in peritonitis occurring after ascites, and after the discharge of an hepatic abscess. It consisted in simply administering large doses of opium and supporting the strength.

Bleeding cannot be practised on account of the depression of the vital powers, and for mercury there is no time; besides that, as Dr. Stokes remarks, it might do harm by increasing the peristaltic action. The object in using the opium is to keep the bowels in complete repose, in order that the organization of coagulable lymph may go on undisturbed, and also to prevent any more of the contents of the canal from escaping. We subjoin the account of the successful case related by Dr. Stokes:—" In the next case the disease was of three days' standing, and it supervened suddenly from a hypercatharsis produced by an overdose of Glauber's salts. The patient was apparently in the last stage when the opium treatment was commenced. He was ordered a grain of opium every hour. Next day the symptoms were decidedly improved, and though he had taken twenty-four grains, he had not experienced the slightest coma, headache, or delirium. The same plan of treatment was persevered in, the daily doses of opium being gradually diminished until the tenth day, when the convalescence being established the remedy was omitted. During this time diarrhœa set in for three or four days severely: this was treated by the application of a few leeches to the anus, and the use of anodyne enemata. The patient took in all 150 grains of opium, exclusive of that in the injections, without experiencing any of the usual effects of this remedy in large doses." (*Cyc. Pract. Med.*, art. PERITONITIS.)*

Chronic Peritonitis.

Acute inflammation of the peritoneum may pass gradually into the chronic form, or the inflammation may be chronic from the commencement.

Anatomical characters. The omentum, the parietal peritoneum, the intestinal folds, and the surfaces of all the abdominal viscera, are not unfrequently found agglutinated to each other, so as to form one mass of disease. Oftener, however, the formation of liquid as well as solid deposits causes a separation of some of the surfaces into sacs of various dimensions. The liquids are serum

* An ample collection of facts, illustrative of peritonitis by perforation, will be found in the *Réch. Anat. Path.*, by M. Louis, in the article by Dr. Stokes above quoted, and in a memoir by M. Cazenave, in *Gaz. Méd. de Paris* for December 30, 1837, and January 6, 1838, entitled " Memoire sur les Perforations intestinales qui surviennent pendant le cours des fièvres typhoïdes."

of a sanious character, sero-purulent fluid, and true pus. Pus is sometimes collected to the amount of several pounds. The solid matter may be coagulable lymph, only in various degrees of organization, but far more frequently it is largely mixed with tuberculous secretion, which is either in the form of miliary semitransparent tubercles, or of opaque yellow nodules, flakes, and masses. Tubercles may be found on the attached as well as the free surface, embedded in the cellular membrane.

The thickening of the peritoneum, whether from fibrin or tuberculous matter, or more frequently the mixture of these substances, varies from two or three lines to three-quarters of an inch. Sometimes the hardness of these formations equals that of cartilage. The surface of the parietal membrane is not unfrequently rough, or presents an areolar appearance, owing partly to the motion of the opposite surfaces while the deposit was going on, and partly perhaps to the simultaneous formation of non-organizable matter, which afterwards separating from the lymph leaves little cavities behind it. The latter explanation is applied by Dr. Hodgkin to the worm-eaten appearance met with on the surface of the liver and the spleen.

M. Louis is of opinion that chronic peritonitis, which has been such from its commencement, is always complicated with tubercles. Dr. Hodgkin observes on this point, " My own inspections would lead me also to the conclusion, that chronic peritonitis is very frequently conjoined with tubercles : yet this concurrence has not been so uniformly supported by cases observed in this country, as it has been by Louis's cases. That form of peritonitis which is accompanied by copious effusion, and which might easily be regarded as ascites, occurs without any appearance of tubercles. The same may be said of other cases in which the concrete product of inflammation had been more considerable." (*Lect. on Morb. Anat. of Serous and Mucous Membranes*, vol. i., p. 149.)

We have in our own experience known some exceptions to this law, though it must be stated that in these cases the peritoneal inflammation was secondary to disease in some of the viscera, such as the liver and the ovaries, and we are inclined to the belief that chronic inflammation, not consequent upon an acute attack, or upon mechanical injury, or upon disease of any other abdominal organ, is confined to scrofulous subjects, and is in fact tubercular.

The colour of the deposits in chronic peritonitis is often dark brown or blackish, owing to the stagnation or effusion of blood, and the chemical action of gaseous acids which have penetrated the intestinal coats, or of decomposed pus. The gray granulations are often surrounded by blackish circles, caused by stagnant blood, which have been mistaken for punctiform melanosis.

The mesenteric glands in this disease are often enormously hypertrophied, and stuffed with tuberculous matter, constituting a form of Tabes Mesenterica. Ulceration may affect communications between the intestinal canal and circumscribed sacs in the peritoneum, or the convolutions may be so matted together that the latter result cannot occur, in which case several similar openings by ulceration may perforate the adherent folds, so as to make false passages or short cuts across the convoluted intestine, while the natural winding passage becomes obliterated by the pressure of deposit from without, and the want of distension from within.

The profession is greatly indebted to Dr. Baron for having been the first to give an accurate account of tuberculous disease of the peritoneum.[*]

Symptoms. The accession and progress of this disease are extremely insidious. In many cases there is but very little pain, in others none at all. In some instances, attacks of pain of a griping character come on for a day or two, and then subside, and do not return for weeks or months. A very common symptom is what Dr. Baron describes as a " broiling heat," in the region of the stomach.

[*] See an Inquiry into the Nature of Tuberculated Accretions of Serous Membranes, &c., by John Baron, M.D., &c. 1819.

We met with a case not long since in which this feeling continued up to the time of decease. The bowels are generally irregular; sometimes constipated, but far more frequently relaxed; the motions being of a light yellow or stone colour, and of spongy consistence, with a good deal of fetor. The patient often complains of nausea, and the tongue has a bright red colour, and is glazed or chapped, or it is of a duller hue, but turgid and uneven on its surface. These states of the tongue, taken in connexion with the nausea and the diarrhœa, often give the impression of disease in the mucous rather than in the serous coat.

When vomiting occurs, the matter is generally of a leek-green appearance, consisting of bile, which has acquired this colour from the action of the acids in the stomach. The urine is scanty, and deposits a reddish sediment. The skin very prone to perspiration, especially at night, and is often muddy and otherwise unhealthy in appearance.

Emaciation is one of the most constant and marked symptoms. The extremities are cold, pinched, and bluish; the eyes are sunken, and surrounded by a dark halo; and there is a faded look of the whole form and countenance. The pulse, in every case of tuberculous peritonitis that we have met with, has been more or less frequent and feeble. But in the chronic peritonitis, left by acute disease, we have known it very little above the average rate.

An examination of the abdomen must be made, and, if conducted with care, it will nearly always enable the practitioner to recognise the disease, if he connects the local signs with the general condition of the patient. There is generally more protuberance than natural; and if there is fluid secretion, we find fluctuation and dulness on percussion; more commonly there is a feeling given to the hand, removed alike from the elastic resistance of fluid or gaseous accumulation, and from the suppleness of the healthy abdomen; a feeling which has been well represented by the term *doughy*. In kneading the abdomen, we seem to move the parietes and viscera together *en masse*. The tenderness is variable, seldom very acute, and in many instances absolutely wanting. In doubtful cases we have been enabled to form an opinion with greater certainty by exploring the chest, and discovering tuberculous disease of the lungs. Frequently we may detect inequalities of the abdomen, caused by masses of tubercular accretion, which, however, must not be confounded with scybala or enlargements of the colon. In many instances we have detected them after fluid effusions had been absorbed; and we have at present under our eye, a young lady in whom a large accretion still exists, left by the ascites of chronic peritonitis, though she has completely regained her health, being subject only to attacks of constipation, apparently caused by the pressure of this formation.

Tuberculous peritonitis is sometimes completely *latent* till a short time before death, which takes place suddenly and unexpectedly. In many cases of this sort the individual has been observed to fall off in general health and strength, and to be somewhat emaciated, but still not in such a degree or in so palpable a form as to awaken alarm or to cause application for professional assistance. Perhaps there have been slight attacks of pain and alvine relaxation, which have passed for common bowel complaints. But suddenly the patient is seized with greater pain than usual, and rapid sinking of the vital powers, and dies within thirty hours. On examination of the body it is found that besides numerous deposits of lymph and tuberculous matter, a circumscribed collection of pus had burst its sac, diffused itself over the whole cavity, and thus caused the fatal termination of the case.

Causes. It has been already admitted that acute peritonitis may terminate in the present form. The tuberculous variety originating primarily in the strumous cachexia may be developed by any of the common causes of disease, both internal and external. A neglected state of the bowels and of the skin, and an attack of fever, may be numbered among the former; and colds, fatigue, and imprudences in diet, among the latter. The most frequent subjects are females between the ages of fourteen and twenty-one.

The *Prognosis* can be scarcely favourable unless the habit of the patient is healthy, and the disease can be viewed as the remains of an acute attack. Cases, however, even of the tuberculous form sometimes improve beyond our hopes. We have already alluded to one of this description, which was the more unfavourable, because the father of the patient had died not long before of phthisis; and Dr. Abercrombie remarks, " I have seen cases terminate favourably in families which had formerly suffered from this affection; and their symptoms corresponded with those which had been observed in the earlier stages of the cases which had been fatal." (*Op. cit.*, p. 191.)

We have been disappointed to find, that after the abdominal disease had appeared to abate, the pleura became similarly affected; and in one case, after this secondary disorder had likewise given way, the patient sank under tubercular meningitis.

Treatment. It rarely happens that general bleeding can be thought of; even topical bleeding by leeches is often as much as the patient's strength can bear. This may be succeeded by or may alternate with blisters. When the disease is in an indolent state, and especially when it is conjoined with liquid effusion, friction with liniments, or unguents containing iodide of potassium, may be used, and we have often been surprised at the rapidity with which ascites of this description disappears under such treatment. It may also be adopted with the view of discussing by absorption the more solid deposits. Iodine may also be exhibited internally, but with caution, and only in combination either with potassium or with iron. Opiates will be required for the relief of pain and diarrhœa. The vegetable alteratives are sometimes useful; such are sarsaparilla and taraxacum. They may be succeeded by or conjoined with light bitters, viz., Dec. Lichen., Inf. Cascar., and Inf. Cinch., to which Tr. Myrrhæ may be added. The diet should be nutritious and compendious.

Peritonitis of the Cæcum.

This form of peritonitis is nearly always connected with disease of the other coats of the cæcum, or of the appendix vermiformis; and its limitation may be attributed to the fixed position of the bowel.

When the inflammation has extended from the muscular and mucous coats, the cause of the disease is an accumulation of fæcal or indigestible matters; such as crude fruits, cherry stones, kernels of nuts, &c. The *symptoms* begin with dull pain and feeling of distension in the right iliac fossa, becoming acute after a few hours, constipation, and nausea. A tumour may be detected in the above situation, which is often acutely tender; and if the patient allows us to handle it, we perceive a dulness on percussion, and a non-elastic boggy sensation. When the inflammation begins in the appendix, which is generally owing to the impaction of some hard substance (such as a kernel, a piece of hard excrement, a biliary concretion, a nail, a tooth, &c.), though an external contusion might also give rise to the disease, the symptoms are from the beginning more acute, and the signs of cæcal accumulation less obvious. This form of the disease is also more fatal, from the impossibility of extricating the irritating substance.

The disease, if not speedily relieved, leads to the formation of abscesses, either in the anterior or posterior parietes; most frequently in the lumbar region, partly because it is the most depending in the recumbent posture, and partly because the cæcum not being covered in that situation by peritoneum, the inflammation extends more readily to the cellular tissue between the gut and the muscles. The abscess may open itself outwardly, or burst into the peritoneum. From the situation of the appendix, Dr. Burne infers that its perforation is more likely to be followed by serious results than that of the cæcum itself. (*Med. Chir. Trans.*, vol. xx.)

This disease is sometimes chronic, and causes gradual disorganization and ulceration of the coats of the cæcum.

The treatment consists in depletion, not however to the extent pursued in idiopathic peritonitis, but chiefly by leeches applied from day to day, fomentations, poultices, and laxatives combined with opiates. When the integuments are œdematous, or when from the emphysematous feel there is reason to apprehend gangrene, no time should be lost in making an artificial opening.

ENTERALGIA.

THE intestines are subject to a painful affection, which can be referred only to neuralgia. It is observed in neurotic subjects of all kinds, but especially in persons affected with dyspepsia, hypochondriasis, hysteria, gout, and suppressed or difficult menstruation. Sometimes it is complicated with irregularities of action in the bowels, and disorder of the secretions, the altered qualities of which produce more irritation than in persons who have not the same predisposition as the subjects of this complaint. Frequently it exists alone, and can be traced to some mental disturbance, or to changes in the atmosphere. The pain is sometimes relieved by pressure, at other times aggravated. When the latter is the case, it may be confounded with rheumatic or gouty pains in the abdominal muscles and aponeurosis.

Enteralgia is in female subjects very often associated with spinal irritation.

This affection is distinguished from inflammatory diseases in the abdomen, by the absence of the characteristics of these, and still more decidedly by the precursory and concurrent phenomena. We have already touched upon this subject in our remarks on the diagnosis of peritonitis.

The *treatment* of enteralgia may be commenced by insuring the removal of any cause of irritation within the canal, by a mild laxative, such as castor oil, with a few drops of laudanum; after which we may employ sedatives with greater freedom. Camphor, henbane, and compound galbanum pill, may be administered when there are reasons for withholding opium and morphia. Anodyne fomentations, and poultices, sedative enemata, and the warm baths, are valuable auxiliaries. If there is spinal tenderness, a few leeches or a blister, or rubefacient embrocations, applied over the lumbar vertebræ, will often do more good than anodynes on the abdominal surface. It is almost needless to add, that the treatment will be very incomplete, if we confine our efforts to the relief of the pain, instead of endeavouring to correct the morbid susceptibility of the nervous system, and to remove the accompanying disorder in other organs. (See the treatment of GASTRALGIA.)

DISEASES OF THE MESENTERIC GLANDS.

Simple acute inflammation.—Tuberculous degeneration.—Calcareous deposition.—Osseous transformation.— Induration.—Causes.—Complications.— Symptoms.— Diagnosis.— Treatment.

1. *Simple acute inflammation* of the mesenteric glands seems to have been noticed by pathologists principally as taking place in the progress of certain forms of fever. Baglivi appears to have had some knowledge of the liability of these glands to be affected in fever, and to have paid particular attention to this

complication of disease as occurring in Rome; but it was in the account given by MM. Petit and Serres of a fever which prevailed at the Hôtel Dieu of Paris in 1811–1813, that the actual state of the mesenteric glands, when they become diseased in the progress of fever, was first very distinctly pointed out. These authors showed that the state of the glands of the mesentery, in those dying of this epidemic, most usually corresponded to that of the mucous membrane of the intestinal canal; that is to say, according as this membrane was less or more ulcerated, the mesenteric glands were less or more advanced in inflammatory degeneration. Hence the name of entero-mesenteritis, which they conferred upon this form of fever. In the writings of the more recent French pathologists, as Cruveilhier, Chomel, and Louis, the frequent co-existence in fever, of disease on the inner surface of the intestinal canal, originating as it is now supposed in the glandular follicles there situated, with disease in the mesenteric glands, seems to be very fully established.

2. The most important structural alteration to which the mesenteric glands are subject, is unquestionably that which has usually been called their *scrofulous*, or, in the language of modern pathology, their *tubercular degeneration*. As being supposed frequently to occur independently of any other form of morbid affection, and to give rise to a peculiar and recognisable train of symptoms, tubercular degeneration of the mesenteric glands has been regarded as constituting a peculiar or special disease, to which many nosologists have applied the name of *Tabes Mesenterica*. It is to be regretted that classical nosology does not possess some shorter term, such as the French name of *Carreau*, for designating this disease.*

The alterations found in the mesenteric glands of persons dying of tabes mesenterica present very great diversities, according to the period at which death has occurred. In a patient dying before the tuberculous affection has made much progress, and consequently before the glands have become entirely converted into tubercles, these organs may be found either inflamed, or not presenting any trace of inflammation. In their inflamed state the texture of the glands is red, swelled, more or less gorged with blood, and more resistant under the scalpel than in their sound state. "At the earliest period at which we have an opportunity of examining the diseased glands," says Dr. Abercrombie, "they present, when cut into, a pale flesh colour, and a soft fleshy texture, and we sometimes find them of very considerable size, though merely presenting this texture." The tuberculous matter is developed in the substance of the inflamed mesenteric glands, under the form of small round irregular grains; in some rare cases it is deposited under the form of small patches, or irregular plates or stripes, which insensibly merge in the texture of the glands, and are closely adherent to it. When, again, the tuberculous glands are not in a state of inflammation, they are neither red, nor swelled nor indurated, sometimes even they are paler than in their healthy state. The tubercular matter is, in such cases, in the form of grains or of small round or irregular masses, and adheres less closely to the glandular texture than when inflammation has existed. It seems to be merely interposed between the gland and the peritoneal coat. The shape of the glands is variously altered, according to the part in which the tuberculous deposition has taken place; and their proper texture, from the compression to which it is subjected, is gradually reduced to a very small volume. When the affection has existed for a great length of time, and is very far advanced, the glands are often completely destroyed, or transformed into masses of isolated or agglomerated tubercles of different sizes, from that of a pea to that of an egg: there can then no longer be recognised any trace of the glandular texture.

* The best monograph on this disease which has yet been published is, in our estimation, that by M. Guersent, in the *Dictionnaire de Médecine*, art. CARREAU, from which we shall freely borrow in the following notices, in the persuasion that we shall thereby render a service to English medical literature.

Mesenteric tubercles pass through all the states of degeneration to which that species of morbid texture is liable in other situations. As the disease advances, according to Dr. Abercrombie, the glands seem to become firmer, and to lose the flesh colour, assuming first a kind of semi-transparency, and afterwards a firm opaque white structure, resembling the white tubercle of the lungs. In a mass of considerable size we often observe these various structures in alternate layers, but in the advanced stages the opaque white tubercular matter is the most abundant, and this appears to become afterwards gradually softened, degenerating into a soft cheesy matter, or ill-conditioned suppuration. It is rare, however, as Guersent remarks, to find very fluid pus in mesenteric tubercles, either because, after pus is formed, it is in part reabsorbed, or because patients frequently sink before the tubercular affection arrives at the stage of suppuration.

3. There is sometimes found in mesenteric tubercles a dry and loamy or *calcareous matter*, analogous to that which is more frequently met with in the bronchial glands when in a state of tubercular degeneration.

4. The mesenteric glands not unfrequently assume the *osseous transformation*, a considerable number of them being sometimes converted into bone : this has often been seen in cases of mesenteric tabes. In general the glands so affected prove, on examination, to be formed of an osseous shell, containing a substance that bears a resemblance to loam or plaster.

5. M. Guersent mentions another species of degeneration sometimes observed in the mesenteric glands, that of *induration*, which, though it has often been confounded with scirrhus, is in reality very distinct from it. The glands, when thus degenerated, are much larger than in health, their texture is of a pale gray, almost entirely colourless, dense, smooth, and resisting under the scalpel, but it is neither so dense nor so shining and transparent as scirrhus. This species of induration is analogous, according to M. Guersent, to that which is observed in entero-mesenteritis, and appears to be the result of an inflammatory degeneration of the glands ; for the same appearance is met with in the glands of the neck, of the bronchia, and of other parts of the body.

Causes. Tabes mesenterica is not, as has been often imagined, a disease peculiar to infancy. Tubercles are found in the mesenteric glands at all ages, in fœtuses from six to seven months, in children dying of birth or soon after it, in infants, in adults, and in persons of fifty or sixty years and upwards. The disease is, in truth, more common between the first dentition and the age of twelve and fifteen years, merely because tubercular affections in general are more common at that period of life. But M. Guersent is convinced that, even in children, mesenteric tabes is not so common a disease as some writers affirm. Bayle states, that out of a hundred dead bodies there are scarcely found four which exhibit mesenteric tubercles. He speaks, indeed, of persons of all ages. But at the Hôpital des Enfans Malades of Paris, where the patients admitted are never below twelve months nor above sixteen years of age, the proportion of cases in which mesenteric tubercles are found, amounts, according to Guersent's calculation, to from seven to eight *per cent.*, at least in girls, who appear to him to be generally more subject to pulmonary and mesenteric tubercular affection than boys, in whom the proportion may be from five to six *per cent.* These results, however, M. Guersent regards as merely approximations to the truth.

As constituting one of the forms of tubercular affection, tabes mesenterica is liable to be produced by all those causes which give rise to scrofula in general, such as a cold and damp residence, and insufficient or bad nourishment (to which last head, according to the opinion of many, must be referred the nursing of infants by a scrofulous, and particularly by a phthisical person), more particularly when these causes operate, singly or conjointly, on persons inheriting a scrofulous diathesis. It seems probable that those causes which

determine the induction of tubercles in the mesentery, rather than in other textures of the body, operate through the intervention of the intestinal canal.

Tubercles may develope themselves in the mesentery in the progress of other diseases. We have already noticed in respect to fever, the frequent coincidence of inflammatory disease of the inner surface of the intestinal canal with similar disease of the mesenteric glands. In mesenteric tubercular tabes, also, the mucous membrane of the intestinal canal, particularly towards the termination of the small intestine, is pretty frequently found red and evidently inflamed on the patches where the mucous crypts are most developed. There are sometimes remarked in these situations, likewise, small, superficial, round ulcers, as well as traces of the cicatrices of such ulcers, which are easily recognisable by the manner in which the mucous membrane is wrinkled and radiated in the form of a star, towards a point that is thinner and darker than the others. Besides these small ulcers, deep ones are sometimes observable, attacking the whole thickness of the mucous, cellular, and muscular coats of the intestine, down to the peritoneum, which is itself sometimes ulcerated and perforated. These large ulcers are arranged in a circular form, and parallel to the transverse valves of the ileum. They are usually studded with fleshy, violet-coloured, bleeding granulations, in the midst of which there are occasionally found small round tubercles, not advanced to suppuration, and adhering immediately to the internal surface of the peritoneal coat. But though these intestinal ulcers are of very frequent occurrence in mesenteric tabes, being observed in more than half of the persons affected with that disease, M. Guersent does not consider them to be essentially connected with the tubercular affection of the mesentery, or dependent upon it. Their independence seems to him to be established by the facts, that the mucous membrane of the intestinal canal is often found perfectly healthy in cases in which mesenteric tubercles have attained a great size, or are even partially softened; and that, on the other hand, intestinal ulcers are very frequently met with in phthisical subjects, without the mesenteric glands being diseased.

M. Louis informs us that of 202 persons dying of tubercular phthisis in whom he examined the state of the mesenteric glands, in twenty-three they were tubercular and enlarged. In all these cases ulcerations were found to exist in the small intestine. But though this author is disposed to believe that inflammation and ulceration of the mucous membrane of the small intestines should be regarded as an occasional cause of mesenteric tubercles in some cases, he is satisfied that there are others in which these tubercles occur independently of any such intestinal affection.

Dr. Home mentions that of eight cases of pulmonary consumption in which the mesenteric glands were found enlarged, three occurred in children, in whom the symptoms of the tabes mesenterica masked in a great measure the pulmonary affection; but when this complication occurred in adults, the tubercular mesenteric glands produced no symptoms.

Complications. The danger and incurability of tubercular diseases of the mesenteric glands depend on the diseases by which it is accompanied. M. Guersent professes himself not to be acquainted with a single case in which a child has died from this affection alone : in all the cases of the disease which he has seen prove fatal, it was combined with other diseases capable in themselves of producing this result. These diseases were sometimes chronic, sometimes acute. Among the former, the more common were chronic peritonitis, with or without sub-peritoneal tubercles, intestinal ulcers, and, in particular, tubercular pulmonary phthisis. This latter disease, more especially, is so often combined with mesenteric tabes, that the mesenteric affection seems to be merely a sort of dependence of it. Out of four cases of mesenteric tabes, related by Baumes, in which examination was made after death, in three at least there were found to be tubercles, or abscesses in the lungs. M. Guersent's observations at the Hôpital des Enfans Malades have furnished him with a still larger proportion of

such cases.   He has found bronchial or pulmonary tubercles in five-sixths of the children affected with mesenteric tabes; so that, with a few exceptions in which the abdomen alone is diseased, most of those who die of tabes are at the same time affected with tubercular disease of the lungs; the rest die of some acute disease, or of chronic peritonitis, or intestinal ulcers.

Symptoms.   The more indolent forms of mesenteric tabes are not indicated by well-marked symptoms.   The functions of individuals so affected do not experience any kind of alteration, unless in consequence of the supervention of other diseases.   M. Guersent, after quoting some striking illustrations of this fact from former authors, mentions that he has himself repeatedly found indolent mesenteric tubercles in children who had died of acute diseases, and in whom nothing had occurred during life to lead to the suspicion of their existence. Examples of indolent tubercles are certainly, he says, much more common in the lungs; but it is not the less certain that mesenteric tubercles may reach the last stage of softening, without sensibly affecting the health and without mani-festing themselves by any pain, or other remarkable symptom.   Persons in whom they exist may retain their appetite and plumpness, proving that the mesenteric glands are not the only channel by which the chyle may pass into the blood.

It is to the inflammatory form of mesenteric tabes, therefore, that almost all that has been written relative to the symptoms of this disease must be considered as applying, since the existence of the indolent form can be ascertained only by the examination of the dead body.   But the diagnosis of inflammatory mesenteric tabes, at its commencement, is almost as difficult and as obscure as that of the indolent form.   M. Guersent does not scruple to affirm, that notwithstanding all that has been said by writers upon this disease, the symptoms by which they pretend to recognise it are for the most part either uncertain or fallacious.   At all events, so far as the diagnosis of inflammatory mesenteric tabes is concerned, we may recognise two different stages.   In the first, the tuberculated glands are not large enough to be detected by manual examination.   In the second period, whatever degree of uncertainty may attach to the other symptoms, the size of the tubercular glands often permits of their being felt through the abdominal parietes, so that there can be no longer any doubt as to the existence of the dis-ease.   M. Guersent mentions the following as the characters which have been assigned by authors to the first stage of mesenteric tabes:—1. Swelling of the belly; 2. Vomiting of a glairy fluid; 3. Diarrhœa, alternating with constipa-tion; 4. Dyspepsia and irregularities in the digestive functions; 5. Milky urine; 6. Acid smell of the transpiration; 7. Paleness of the face, with a livid colour beneath the lower eyelid, &c.   With this enumeration of symptoms we may compare that given by Dr. Joy:—1. Pain; 2. Constipation and diarrhœa, including the appearance of the alvine evacuations; 3. Enlargement of the abdomen; 4. Emaciation; 5. The character of the features; 6. The state of the tongue; 7. that of the appetite; 8. that of the pulse; 9. that of the skin and its secretions; and, 10. that of the mind.   (*Cyc. Prat. Med.*, art. TABES MESENTERICA.)

M. Guersent, after passing in review the several symptoms that have been enumerated as constituting the physiological characters of mesenteric tabes, expresses his conviction that almost all the symptoms which have hitherto been assigned to this disease do not really appertain to it, but depend on several other affections of the abdomen, with which it is often confounded, or on other diseases which usually accompany in its course.   The only pathognomonic symptom, the only positive character by which we can recognise this disease, and that only in its most advanced stage, is feeling the tubercles; all the other symptoms are more or less doubtful, and masked by those of the diseases with which mesenteric tabes is usually complicated.

Diagnosis.   The diseases with which mesenteric tabes in *its first stage* is most liable to be confounded are chronic peritonitis, chronic inflammation of

the small intestine, and intestinal ulcers. The following are some of the circumstances by which the diagnosis may be assisted :—1. The patient affected with tabes in the first stage, if old enough to express his feelings, complains almost continually of pain, the seat of which he refers to the middle of the belly, but which is never acute nor analogous to colicky pains, unless the tabes is accompanied with inflammation or ulceration of the intestinal canal. 2. The pain increases when pressure is made with a little force, about the lumbar vertebræ, and in a direction from behind forwards. 3. The pain is not superficial, and is not accompanied, like that of chronic peritonitis, with considerable tension of the belly, vomiting, and dulness ; nor is it attended, like that of intestinal ulcers, with diarrhœa of gray and yellowish matters, and a peculiar alteration of the features. 4. The pain in tabes often continues for a very long time, and sometimes even for several years, without any other remarkable characters presenting themselves. 5. It recurs more especially in spring and autumn, at which seasons tubercular affections in general are liable to experience aggravation and inflammation, and it almost uniformly disappears during the heat of summer. 6. The alvine evacuations in tabes are more or less fluid and variously coloured, but they are never glairy and bloody, as in cæco-colitis and dysentery.

These characters belong almost equally to chronic inflammation of the small intestine and to tubercular mesenteritis ; and as these two morbid states are most frequently found combined, and present common and analogous characters, it is almost impossible to distinguish between them. The circumstances on which such a distinction may be attempted to be founded, in cases in which these affections occur separately, seem to be that in chronic enteritis the smallest deviations from strict regimen almost always induce diarrhœa, and a slight increase of abdominal pain on pressure ; whilst running, leaping, and hiccough, do not produce this last effect. But in inflammatory mesenteric tubercles, on the contrary, violent abdominal successions increase the pain, whilst distension of the intestines, produced by errors in diet, does not aggravate the pain in any remarkable degree. Perhaps, even, the mesentery is less painful on pressure when the intestinal canal is full.

The general symptoms that present themselves in the course of tabes mesenterica, seem to be principally referrible to the other morbid affections with which it is usually accompanied ; thus cough, fever, and emaciation, for example, when they occur in the progress of a case of this disease, often depend on pulmonary phthisis. Provided the other organs of the body retain their sound condition, the mesenteric glands may be crowded with tubercles, without the general health being thereby disturbed.

In the advanced stage of the disease there can almost always be felt, on a careful manual examination, hard, round, knobbed bodies, deep-seated, about the middle of the belly. The co-existence of chronic peritonitis, or of effusion, may prove impediments to the recognition of these glandular enlargements. Scybala in the intestinal canal have been sometimes mistaken for enlarged mesenteric glands, particularly in very thin persons ; but even the most indolent tubercles, when they have attained a certain size, are always painful on pressure, whilst scybala on the contrary never cause pain. The difference in their position also should assist the diagnosis : tubercles usually occupy the ileocæcal and umbilical regions : scybala the left iliac fossa or hypogastric region. Such an error, too, is the less likely to happen, inasmuch as the latter stage of tabes is almost always accompanied with diarrhœa.

The general symptoms that have been assigned, by authors, to the latter stage of tabes mesenterica, viz., hectic fever, emaciation, swelling of the extremities, and effusion into the belly and other cavities, are none of them peculiar to this disease, being met with in a number of other affections, pulmonary and intestinal, which are the usual concomitants of the mesenteric affection.

Treatment. To practitioners who regard as mesenteric tabes, in its first

stage, every case of swelling of the belly attended with dyspepsia, flatulence, alternate diarrhœa and constipation, and emaciation of the extremities, it appears a matter of no great difficulty to cure that disease. These symptoms, which depend in some cases on simple intestinal derangement, in others on incipient chronic enteritis or peritonitis, &c., may disappear more or less speedily under the influence of the curative methods employed, evacuants, antiphlogistics, tonics, &c., according to the nature of the several cases. But to the practitioner who gives the name of mesenteric tabes only to those cases in which its actual existence is certain, it is by no means so easy to obtain a cure of this disease. M. Guersent is satisfied that in all cases in which the existence of mesenteric tabes is well ascertained, which it can only be by the touch, it usually proves fatal, not, as has generally been supposed, in consequence of the effects which result from the morbid degeneration of the glands themselves, but of those effects which necessarily arise from the diseases by which it is complicated.

M. Guersent conceives that in a case of indolent mesenteric tabes, sufficiently advanced to be recognised by the touch, but still uncomplicated with any other disease, benefit might possibly be derived from the resolvent means which are employed in strumous tumours in general, and in particular from those, the efficacy of which in the strumous affection of the mesentery has been so much boasted of by authors, such as the extract of cicuta, the acetate of potass, the protochloruret of mercury (calomel), the oxides of iron and ferruginous preparations, mineral baths and particulaly sea baths; these means being seconded by enforcement of the regimen which is suited to other tubercular affections. But this author acknowledges that a case of this simple kind has never fallen under his own observation ; and that it is from the success with which tumours evidently tubercular, seated in the neck, axilla, and elsewhere, are occasionally resolved, that he is disposed to admit the possibility of reabsorption or resolution of tubercles of the mesenteric glands, organs that are possessed of little sensibility, and the functions of which do not appear notwithstanding all that has been said, to be very necessary to the preservation of life.

By the time it becomes possible to recognise the inflammatory form of tubercular degeneration of the mesenteric glands, and to distinguish it from other diseases of the abdomen, no remedy in general can be of any avail. The lungs, in almost every such case, have been for a length of time in a state of disease. The liver, the spleen, and the whole of the sub-peritoneal cellular texture have, in many instances, become affected with tubercles. The patient is tormented by hectic fever, and the mesenteric disease is then said to be in its third stage. The use of any of the pretended resolvent medicines under such circumstances would be injurious and dangerous,—it could only accelerate the fatal termination. The physician is reduced to the melancholy part of employing the same palliative mode of treatment as is suited to the advanced stage of pulmonary consumption, of tubercular peritonitis, or of intestinal ulcers.

An example of inflammatory mesenteric tabes, uncomplicated with any other affection, might by chance be met with. In such an event, the physician, after having combated the inflammatory symptoms by antiphlogistics, tepid baths, and strict diet, as in a simple inflammation of the mesentery, when the pain, diarrhœa, fever, and all signs of irritation have ceased, should treat the case as one of indolent tabes. "But here," say M. Guersent, "I strive to suppose curable cases ; and I repeat, I have never met with any such, when no doubt could be any longer entertained as to the actual existence of the disease."

Participating, as we are constrained to do, in these unfavourable opinions relative to the curability of mesenteric tabes, we shall terminate the consideration of the treatment of this disease with a simple enumeration of the various remedies, in the way of external applications and of internal medicines, which have at one time or other been employed in this disease, and of many of which the practitioner may be glad to avail himself in the various modifications and com-

plications which it is liable to exhibit.   We shall take this enumeration from the monograph by Dr. Joy already referred to :—*External applications*,—leeches ; tepid, sulphureous, and cold baths ; electricity ; stimulant and anodyne frictions or plasters ; counter-irritation by tartar-emetic ointment, by croton oil, &c.   *Internal medicines*,—purgatives and aperients ; alteratives, including mercurials, antimony, guaiacum, sarsaparilla, &c. ; antacids, as the liquor potassæ, carbonate of soda, &c. ; tonics, as iron, bark, bitters ; and the so-named deobstruents, such as muriate of barytes, burnt sponge, iodine, cicuta, &c.

DISEASES OF THE BILIARY ORGANS.

GENERAL VIEW OF THEIR CAUSES.

Atmospheric heat.—Diet.—Bodily inactivity.—External injuries.—Alcoholic liquors.—Mercury.—Foreign matters circulating with the blood.—Mental emotions.—Diseases of other organs.

BEFORE proceeding to the consideration of the special diseases of the biliary organs, we shall take a general view of the various causes in which they are known to originate.

1. The agent which seems to have most influence in producing diseases of the biliary organs is atmospheric heat, as is proved by their greater prevalence in hot than in cold or temperate climates, and in hot than in cool seasons in the same climate.   Those who are exposed to the direct rays of the sun seem to be more particularly subject to hepatic affections, especially if this be followed by exposure to the night dews and malaria.   Mr. Annesley calculates the average annual per centage of hepatitis in the East Indies to be at least treble what it is in the Western hemisphere, and he supposes the greater prevalency of this disease in the southern than in the northern provinces of India, to be in a great degree dependent upon the nature of the soil and climate, and the higher mean annual temperature.   It appears from the statistical report on the troops in the West Indies, prepared from the records of the Army Medical Department and the War-office returns, that though diseases of the liver are by no means so common among the troops on that service as among those employed in the tropical regions of the Eastern hemisphere, they are nearly thrice as prevalent as among troops in the United Kingdom, and occasion about five times as high a ratio of mortality.   They vary materially, both in prevalence and severity, at different stations in the West Indies, occasioning at Grenada, for instance, three times as much mortality as at most of the other islands, and that without any very apparent cause.   In Jamaica, considering the high degree of temperature in that island, diseases of the liver are by no means very prevalent or fatal ; and many parts of the island enjoy a remarkable immunity from them.   It appears also from the statistical report, that the mortality in the West Indies from these diseases, is much less among the black than among the white troops.

Though cases of diseased liver are more numerous in hot than in temperate regions, they seem to be less varied in their nature.   In India, the diseased appearances in that organ are generally confined to inflammation and its effects, suppuration or induration, while the different species of tubera, or hydatids, are by no means common.   Some authors allege, that biliary concretions are seldom observed in the hepatic passages in India ; but this is not conformable with the experience of Mr. Annesley, who states that they frequently form in warm climates in the gall-bladder, and often produce inflammatory action in that receptacle, and in the cystic or common duct, not unfrequently attended

with spasm. Mr. Twining also makes mention, in his work on the diseases of Bengal, of concretions in colour and consistence like yellow soap, extending along the biliary canals, through a considerable space.

It occasionally happens that some of the diseases of the liver assume an epidemic character. Dr. Chisholm mentions an affection of this description, under the name of anomalous hepatitis, which he witnessed in Grenada, and which he believed to be propagated in some degree by infection. A considerable number of instances have been recorded of the epidemical occurrence of jaundice. Thus Dr. Cleghorn mentions a slight jaundice without fever, which soon yielded to purgatives and saponaceous medicines, as having been a " common distemper in Minorca in July and August, 1745" (*Obs. on the Epid. Dis. of Minorca*); and Dr. W. Batt has described a similar affection (*Edin. Med. and Surg. Journ.*, vol. i., p. 107), as occurring in Italy in 1792-3.

2. The quantity and quality of the food that is used are by no means unimportant, as regards the action and condition of the liver. An over proportion of animal food seems to favour an excessive secretion of bile, and there can be no doubt that variety and high-seasoned dishes exert a very prejudicial effect upon the liver, whether immediately or as temptations to excess in the use of animal food.

3. That persons leading a life of bodily inactivity, and those engaged in literary pursuits or other sedentary employments, are peculiarly liable to hepatic disease, seems to be very generally admitted. By some this has been attributed to the habit of leaning forward, to which such persons generally yield, and the consequent pressure to which the biliary organs are subjected. But the more commonly received opinion is, that the want of exercise causes inactivity of the hepatic system, and thereby lays a foundation for derangement of the biliary organs. It is probable that the venous circulation of the liver is promoted by bodily exercise, and that by its neglect this circulation becomes proportionally languid.

4. External injury inflicted upon the region of the liver, independently of the mechanical effects of contusion and rupture, may give rise to different forms of diseased action in that organ. Its most frequent consequence, unquestionably, is inflammation; and traumatic hepatitis may pass through all the same stages as when it depends on internal causes. But a blow on the region of the liver is sometimes followed, at a longer or shorter interval, by the developement of a simple serous or of an hydatid cyst, or perhaps some other form of non-inflammatory structural alteration.

5. The influence of alcoholic liquors in inducing diseases of the liver has been insisted on, both as respects tropical and temperate climates, with this difference, that in the former it is inflammation of a more or less acute character which is produced by this noxious agent, while in temperate climates fatal cases arising from this cause generally exhibit the granular degeneration. The belief that wine and spirituous liquors operate specifically in the production of liver complaints was opposed by Dr. Mills of Dublin, who affirms that persons who indulge freely in the use of these liquors are not the most subject to those ailments; that they occur in those who are temperate, and are found even in children and infants. It has been remarked also, that the troops stationed in Nova Scotia and New Brunswick suffer less from diseases of the liver than those at home, although, from the low price of spirits, there are few stations where the intemperance is greater. It may be observed too, that Sir G. Ballingall, while he conceives that, in India, affections of the liver are obviously, in a great majority of instances, the joint effects of climate and intemperance, acknowledges that in others we find them to be the result of climate alone. When originating solely from the latter cause, he adds, they are often very obscurely marked.

6. It is a well-established fact, that mercury, administered as a remedy, occasionally causes hepatic disease, which presents itself sometimes under the

distinct characters of hepatitis, and sometimes under the more obscure garb of jaundice. The first notice of this operation of mercury with which we have met, is contained in a letter by Dr. Sherwen, dated from the Ganges, in September, 1770. Dr. S.'s experience of this action of mercury was confined to a single case. Dr. Dick, who practised long in Calcutta, states in a letter to Dr. Saunders, that he has often observed chronic liver attacks succeed to long courses of mercury, undergone for the cure of venereal complaints. Dr. Cheyne, in the space of two years, met with three cases of jaundice produced by mercurials; and he had been creditably informed of its appearing in large venereal establishments during the exhibition of mercury. (*Dub. Hosp. Rep.*) Dr. Nicholl, when serving in India with the 80th regiment, occasionally observed hepatitis come on a few days, but often weeks, after a mercurial course for a venereal complaint; a great proportion of the soldiers who had been treated in this manner for syphilis suffered from inflammation of the liver; and in eight instances the same effect was produced by the exhibition of mercury, administered for the cure of chronic ophthalmia. Dr. Chapman, of Philadelphia, relates cases of a similar description, and ascribes the prevalence of hepatic complaints in his neighbourhood to the employment of mercury in the cure of autumnal fevers; he also states, on the authority of some old practitioners, that previously to the introduction of the mercurial practice into that district, hepatitis was scarcely known in it.

7. The occasional occurrence of abscesses in the liver, in cases of injury of the head, has long been noticed, and was at one time supposed to indicate the existence of a peculiar sympathy between the head and the liver, a doctrine to which we shall have occasion afterwards to advert. But, besides secondary abscesses, the liver is, as we shall presently see, very liable also to become the seat of secondary malignant growths, in whatever part of the body the primary disease may have developed itself. These facts would seem to imply that foreign matters, circulating with the blood, are peculiarly liable to be detained in this depuratory viscus, and suggests the inquiry whether any thing analogous can happen in respect of alcohol and mercury, when these exert a noxious influence upon this organ. In some interesting experiments of M. Cruveilhier, it was found that when mercury was introduced into the abdominal venous circulation, it was for the most part arrested and deposited in the liver, causing inflammatory action in that viscus; and that, on the other hand, when introduced into the general venous circulation, it was usually arrested in the lungs. These results, however, M. Cruveilhier acknowledges not to have been uniform, the mercury being sometimes deposited in other organs. Dr. Percy detected alcohol in the blood, the urine, the bile, and the liver, and it was separated from the latter with great facility, a circumstance which he thinks may account for the frequency of hepatic disease in drunkards. Andral had previously suggested that the alcoholic particles introduced into the alimentary canal, being carried directly to the liver by the meseraic veins, may in this way act as a direct irritant upon that organ. Whatever may be thought of M. Cruveilhier's views relative to the production of liver disease by substances introduced into the alimentary canal, it seems probable that in many cases it is on the mucous membrane of this canal that alcoholic liquors exert their first morbific effect, and that this is afterwards communicated, by extension, to the mucous membrane of the gall-ducts, and the parenchyma of the liver. Dr. Saunders says, that in dram-drinkers the diseased structure may be traced from the stomach along the course of the ductus communis, and that he has frequently seen the gall-ducts so contracted and thickened in such persons, that they could not transmit bile.

8. The influence of mental emotions over the biliary organs is illustrated by the occurrence of jaundice from a fit of passion, and by the sallowness and other symptoms of biliary disturbance that frequently attended hypochondriasis. Mr. Annesley remarks, that the depressing passions are not always to be re-

garded as symptoms, but in some cases as the cause of hepatic disease; and Dr. Wilson Philip alleges, that not only does mental depression often instantly derange the functions of the liver, but that it seldom fails, if long continued, to affect its structure.

9. Affections of the biliary organs are liable to succeed to diseases of other organs, which may in such circumstances be regarded as standing to them in the relation of exciting causes. We shall, therefore, introduce here a few observations on these successions.

That the liver is liable to undergo morbid changes in the progress of fevers, especially those of a remittent and intermittent type, is attested by general experience. In nearly half the fatal cases of the typhoid fever of Paris, M. Louis found the liver in a state of softening. Dr. Davis found in the bodies of those who died subsequently to their suffering from the intermittent fever during the Walcheren expedition, that the liver was generally congested, and sometimes of a gelatinous consistence, and the portal system obstructed. But the affection of the liver accompanying fevers in hot climates, is often of a decidedly inflammatory character. Dr. Nicholl says, that in India acute hepatitis is frequently complicated with fever, as well as with dysentery or diarrhœa, but whether as the effect or as the cause he cannot determine.

That diseases of the biliary organs, dynamical perhaps at their commencement, and becoming structural in their progress, may take their origin from affections of the alimentary canal, and particularly of the duodenum, seems, both from anatomical and physiological considerations, to be extremely probable. M. Andral is disposed to concur in the opinion of Broussais, that in most cases of inflammation of the liver, there has been previous duodenitis. The observation of symptoms seems to him to favour this conclusion; and in some cases, the examination of the dead bodies of jaundiced persons has disclosed acute duodenitis as the only lesion. We have already referred to the general belief, that the primary morbific action of spirituous liquors is on the alimentary canal, and that continuous traces of disease may be observed extending from this canal to the substance of the liver, in persons addicted to intoxication. Ribes suggested (and Andral seems to have agreed in the opinion), that inflammation commencing in the intestinal canal may propagate itself to the liver, not only along the mucous membrane, but also along the veins. It seems not impossible that inflammation of the duodenum, without extending beyond the orifice of the ductus communis, may obstruct the flow of the bile, so as to occasion in the first place jaundice, and eventually organic disease of the liver. Dr. Stokes thinks that the dependence of hepatic affection on duodenitis is to be explained on a different principle; he supposes that the gastro-duodenitis acts sympathetically on the liver, but without exciting hepatic inflammation; and that the jaundice by which this affection is attended, is the result of a mere lesion of the innervation of the liver.

Dr. Marsh has adduced several cases to prove, that a long continued obstruction of the large intestines from an accumulation of scybala, occasionally causes jaundice; but he offers no explanation as to the modus operandi of this cause. It was long ago, however, suggested by Dr. Coe, that jaundice may depend upon the " duodenum being loaded with such contents as to stop the orifice of the duct, or the colon being stuffed with hard fæces pressing upon the duodenum and ducts."

Dysentery is one of the diseases with which hepatitis is very liable to be complicated, particularly in tropical climates. Much doubt has existed as to the relations of these two diseases—which of them ought to be regarded as the primary, and which as the secondary affection, or whether they should be considered as parts of the same disease. Dr. Nicholl says, that in India he has sometimes seen hepatitis come on immediately after the subsidence of dysenteric symptoms; while, in other cases, weeks and months have elapsed before the appearance of hepatic symptoms.

We shall again have occasion to allude to the influence of diseases of the heart, and particularly of such as impede the emptying of the inferior vena cava into the right auricle, in producing sanguineous congestion of the liver ; a subject which has been especially considered by Corvisart. (See art. INFLAMMA-TION OF THE LIVER, *post.*)

We can easily understand that diseases of the *lungs*, by occasioning an impediment in the circulation of the blood, may act back upon the liver. Mr. Paisley, formerly head surgeon in Madras, particularly noticed this connexion between diseases of the lungs and morbid conditions of the liver ; and Dr. Powell has frequently observed the liver gorged and enlarged, of a looser texture, and softened, in examining phthisical patients, or such as from any cause had the lungs rendered less pervious than natural.

That fatty degeneration of the liver is a very frequent attendant on pulmonary consumption, seems to be well established, though of the nature of their connexion it is impossible to suggest any explanation. Laennec remarks, that fatty infiltration of the liver is found in other chronic diseases, and even without any serious concomitant organic lesion ; and he does not agree with Broussais, who believes it to be the consequence of inflammation of the duodenum. Of 49 cases of fatty liver which presented themselves to M. Louis's observation, 47 occurred in phthisical persons ; so that, as he observes, it may certainly be considered as a dependency on that affection. He concurs with Laennec in refusing to recognise diseases of the duodenum as one of the causes of this morbid production, seeing that duodenal affections are very rare, and quite as unfrequent among persons with fatty as among those with healthy livers. Dr. Homo mentions, that of 65 cases of phthisis in which the liver was examined, in the Edinburgh Infirmary, in 10 it was in a fatty and in 5 others in a waxy state. All these cases of diseased liver, except one, occurred in women. In 23 of Dr. Home's 65 cases, the liver exhibited different forms of the early stages of cirrhosis, —a morbid condition which is not noticed either by Louis or Andral as occurring in the liver of phthisical patients.

The fatty liver is almost exclusively confined to two different classes of individuals : to phthisical young women, and to drunkards. The most probable cause of the alteration is the condition of the blood, which must be gradually altered under the influence of causes which are totally distinct ; as the hydrogen and carbon predominate, fatty matter is thrown out into the tissue of the liver, alone, or in the liver and cellular tissue of the body : the former is true of phthisical patients—the latter of drunkards.   G.

The frequent coexistence of diseases of the liver and of the brain was particularly noticed by Dr. Cheyne, who pointed out various cerebral affections, in which there is frequently coincidence of dynamical derangement, or of structural alteration of the liver. On the question of priority and succession in these two classes of diseases, Dr. Cheyne remarks, " that the brain should be suddenly affected in consequence of its connexion with the liver, is not more remarkable than that the liver should be suddenly disordered from affections of the brain. Yet this last is an established observation. I am informed by a gentleman who has occasion to dissect a great many bodies, that, in diseases of the brain, he never fails to find the liver diseased, either as a cause or a consequence. The same gentleman assures me, that the liver generally discovers the marks of recent inflammation after fatal injuries of the head. Every surgeon knows that abscess of the liver is a common effect of injury of the brain."

Dr. Prichard, in referring to a statement of the late Mr. Todd, as quoted by Dr. Cheyne, that in every dissection he had made of cases of idiotism and mental derangement (amounting to upwards of 400), he had found the liver more or less diseased, acknowledges that, in his own practice, the instances have not been numerous in which organic disease of the liver, or other large viscera, has been discovered in conjunction with maniacal disorders. But of the con-

junction of such diseases with epilepsy, he has seen a sufficient number of cases
to conclude that there must be some sympathy or connexion, depending on some
unexplained principle of pathology, between that morbid state of the brain which
gives rise to epilepsy, and a diseased state of the liver, and other large viscera
of the abdomen.

The liability of the liver to become the seat of abscesses, subsequently to
the reception of injuries on remote parts, was first taken notice of in regard to
injuries of the head. Paré mentions examples of this occurrence, and endea-
vours to account for it. Subsequently to his time, many similar cases were re-
corded by surgeons, and various explanations of this occurrence proposed.
Some supposed that the matter of the abscess was originally formed within the
head, and in some way or other conveyed to the liver. In progress of time it
was ascertained, 1st, that the liver is not the only organ in which abscesses are
found subsequently to injury of the head; and, 2dly, that injury of the head is
not the only form of remote lesion, which is followed by abscess of the liver or
other organs; and hence it becomes necessary to look beyond any relation between
the head and the liver, or between any other two portions of the body, in at-
tempting an explanation of this phenomenon. Recent discoveries suggest the
probability of the veins being the medium of communication between the seat
of injury and the seat of the consecutive abscess, and that inflammation of the
lining membrane of these vessels in the part injured, the consequent formation
of pus, and its introduction into the circulation, are some of the steps of the
process. But whether the pus thus formed in the seat of the primary lesion is,
in some instances at least, simply conveyed to and deposited in the seat of the
consecutive abscess, or whether it gives rise there, in all cases, to a new inflam-
mation, in the course of which the abscess is formed, is a point which remains
open for further investigation,—some pathologists at present inclining to the one,
and some to the other of these opinions. (See *Edin. Med. and Surg. Journ.*,
vol. iii.)

FUNCTIONAL DERANGEMENTS OF THE BILIARY ORGANS.

General description.—Diminished biliary secretion.—Excessive biliary secretion.—Vitiated
   biliary secretion.—Impeded excretion of bile.—General view of the symptoms.—Treatment
   of functional derangements of the biliary organs.—Biliary concretions or gallstones.—Their
   symptoms and treatment.

As the peculiar functions of the liver and its appendages consist in the secre-
tion and excretion of the bile, the functional derangements of these organs must
obviously be referrible to an increased, a diminished, or a vitiated secretion of
that fluid; or to its impeded, altered, or deranged excretion. These various
disturbances of the functions of the biliary organs may, there is reason to be-
lieve, occur independently of perceptible alterations in their structure; or they
may occur as consequences of, or at least in combination with, obvious struc-
tural alterations. But whilst the bile may undergo various morbid changes
without apparent disease of its secreting organ, on the other hand, it may pre-
sent, to all appearance at least, its natural characters, and be found in its usual
quantity and situations, in cases in which there exists extensive structural altera-
tion of the liver.

On what pathological conditions of the solids or fluids can morbid secretion
of bile, in respect of quantity or quality, be supposed to depend? The following
appear to be the principal morbid states to which such an effect can be referred:
1, those of the blood, out of which the secretion is formed; 2, those of the

secretory apparatus of the liver, by which its formation is effected ; 3, those of the nervous system, as influencing the biliary secretion, both organically and mentally ; and, 4, those of other organs, more or less remote, which exert an influence over the secretory apparatus of the liver.

We can easily conceive that the blood may at one time contain more, and at another time less, than a due share of the principles which enter into the composition of bile, and that such variations in the composition of the blood may affect the quantity of bile produced.   The amount of this secretion may also be supposed to be influenced by the quantity of the blood which reaches the liver, and the length of time that it remains there.

Any notion we can form as to changes in the condition of the secretory apparatus of the liver, capable of modifying the biliary secretion, must rest on the idea of secretion being, more or less, a process of filtration.   Sometimes the blood passes through the biliary apparatus, little if at all changed ; and this circumstance favours the idea that modifications may occur in the state of this apparatus, capable of occasioning some variety in the physical and chemical qualities of the *bile*.

Without insisting on the general physiological doctrine of the dependency of glandular action upon the nervous system, we may remark that various pathological phenomena lead to the recognition of an organic influence exerted by the brain over the biliary function in particular ; but we shall find that it is not always very clear, whether it is the secretion or excretion of bile that is primarily affected in this manner.

Physiology seems to show that the duodenum is the organ, the varying conditions of which have the most immediate influence on the biliary function. The flow of bile into the duodenum is not constant, but occasional only, depending upon the presence of foreign matters in that portion of the intestinal canal : it is probable that where excretion is interrupted by any cause, secretion will be more or less arrested ; and, on the other hand, that where excretion goes on with more than usual activity, a corresponding impulse will be given to secretion.   Hence we can suppose, that under various morbid conditions of the duodenum, the biliary secretion may be affected at least in respect of quantity.

Before noticing more particularly the several modifications to which the biliary secretion is subject, we may remark, that a general belief in their frequent occurrence, and in their powerful influence in impairing the function of digestion, has led to the recognition of a class of maladies, termed Bilious, without the precise signification of this term having been very clearly defined. Some physicians seem to comprehend under it those diseases of the digestive organs that are attended with excess or redudancy of bile ; others, those in which the bile is deficient or vitiated : while others extend it to all derangements of the digestive functions, attended with any form of biliary disorder. Nor has much discrimination been shown in distinguishing between cases of impaired digestion, actually depending upon deranged biliary secretion, and those referrible to other morbid states of the organs concerned in digestion ; the terms " impaired digestion" and " deranged biliary secretion" being not unfrequently used as synonymous, as if the secretion of bile was the only condition upon which digestion depends.   But when we consider how very complicated a phenomenon digestion is, it must be apparent that its disturbance is not likely always to depend upon the same cause, and that consequently the mere occurrence of indigestion is no positive proof of a morbid condition of the biliary secretion.

Diminished Biliary Secretion.   The only positive means of ascertaining that there exists a deficiency of the biliary secretion, or (as some term this condition) the state of torpor of the liver, is by finding the fæces more or less pale, or of a dull white or ash-colour, in cases in which there is no evidence of mechanical obstruction to the flow of the bile.

There is a class of cases of great interest, in which some pathologists imagine

that there occurs not only a diminution, but a suspension or suppression, of the biliary secretion.   In these, jaundice occurs, although on post mortem examination no disease of the liver, nor any obstruction to the flow of the bile, is perceptible, while the bile-ducts are absolutely empty.   It is argued that the jaundice must in such cases be owing to the non-separation, from the blood, of the elements of which the biliary secretion is composed.   The advocates of this explanation suppose that there is an analogy between this affection and that of the suppressed secretion of urine.   In both, the supervention of coma implies the action of a poison on the nervous system.   In ischuria renalis, urea is discovered in the blood, as it is in animals whose kidneys have been extirpated.   In jaundice, the presence of bile in the blood cannot be doubted.   To account for the rapid fatality of this species of jaundice, Dr. Alison has very ingeniously suggested that the economy sustains more injury from the excrementitious principles not being separated from the blood at all, than from their reabsorption subsequently to their separation; and in this circumstance, again, he finds an additional point of analogy between this form of jaundice and renal ischuria, which is a much more severe affection than where the urine is reabsorbed into the system after having been secreted.

When either diminished secretion or suppression of bile occurs as a dynamical affection, on which of the several pathological conditions recently noticed can it be supposed to depend?   This is a question to which we are probably far from being able to give a satisfactory reply.

A deficiency of bile might be expected most usually to accompany structural alterations of the liver, when portions of that organ are more or less completely destroyed, or altogether removed.   But experience shows that, in many cases at least, the secretion is carried on at its usual or even at an increased amount, when there exists very extensive disorganization of the liver.   It is alleged, that when gall-ducts become impervious, the secretion of bile may cease, being no longer subservient to any purpose.   Such a cessation may be supposed to depend immediately, either on the cutting off of the necessary stimulus to secretion derived from the duodenum, or on the pressure of the retained bile upon the secretory apparatus.

Excessive Biliary Secretion.   Of the occurrence of an excess, as of a deficiency, of the biliary secretion, our principal means of judging must be derived from the appearances, and particularly the colour, of the alvine evacuations. This mode of judging is, however, sometimes fallacious; a small quantity of bile may be diluted with fluids in the intestinal canal, so as to give the appearance of copious bilious alvine evacuations; or matters existing in the alvine evacuations may be mistaken for bile, when in reality they are of a very different nature, as when they consist of blood more or less altered.   "It is possible," observes Dr. Abercrombie, "that the bile may be increased in quantity, but it must at the same time be admitted that our prevailing notions on the subject are rather hypothetical, than founded on facts."   "I am not aware of any tests, by which we can judge with precision of its redundancy in the alvine evacuations." Demonstrative proof of an increased biliary secretion is, however, frequently obtained in post mortem examinations.   Andral has found the liver gorged, and the intestinal canal filled, with bile, in several cases of copious diarrhœa, in which this could not be attributed to suppressed excretion.   The liver, with the exception of the engorgement, exhibited in these cases nothing unusual, but the mucous membrane of the intestines was inflamed and ulcerated; sometimes there was merely injection of its vessels.

It is very generally alleged, that an increased biliary secretion is a common consequence of an elevated temperature.   Considerable ingenuity has been displayed in accounting for this fact, especially in respect of natives of a temperate exposed to the influence of a hot climate; to which exposure the increased secretion and all the derangements consequent upon this change of climate have been referred.   According to one hypothesis, the increased biliary secretion in hot

climates depends on a sympathy between the extreme vessels on the surface of the body, and those of the vena portarum; while others suppose it to depend upon a vicarious connexion between the liver and lungs, which enables one of these organs to perform in part the functions of the other. It has been found, that the quantity of carbonic acid gas formed in respiration, in a given time, is much diminished by a high temperature, and by other circumstances which, as it is said, lower the powers of life. Hence, the excess of carbon must be carried off by some other channel than the lungs; and as bile is chiefly formed of carbon and hydrogen, an increased secretion of that fluid will guard the system against the superabundance of the former of these substances. To this cause, therefore, has been assigned the increased flow of bile in warm climates; and a similar explanation is offered of its occurrence from other causes, such as sleep, depressing passions, fatigue, stimulating drinks, &c., viz., that their primary effect is to diminish the quantity of carbonic acid gas formed in respiration.

As to the pathological conditions, out of which excessive biliary secretion may be supposed to arise, the explanation just given of its connexion with an elevated temperature obviously implies, that it may have its immediate origin in the condition of the blood, as containing a larger proportion than usual of the constituent elements of the bile, the presence of which may urge the liver to excessive action. Whether there be any other circumstances besides those already enumerated, in which such a state of the blood is engendered, seems to be a matter well worthy of investigation, particularly with reference to diet, and more especially the plentiful use of animal food. When jaundice occurs without deficiency of bile in the stools, we may conclude that there exists a redundancy of the biliary principles in the system. Increased biliary secretion may also proceed from altered states of the hepatic circulation; thus it may be excessive in hepatic congestion, and in the first stage of hepatitis. 2. It does not seem to be produced by any dynamical condition of the hepatic secretory apparatus. 3. It may be occasioned by any particular states of the nervous system, or by mental emotions? That a fit of passion has been succeeded by jaundice is well known, but the connexion between these phenomena is very obscure. 4. Increased biliary secretion has usually been supposed rather to give rise to, than to depend upon, deranged action of the intestinal canal, as in the production of bilious diarrhœa and cholera.

Vitiated Biliary Secretion. That the bile is liable to undergo various modifications in the constituent elements, is shown by the diversities which it presents in its physical characters, as it is found in the gall-bladder and ducts in fatal cases; and is further confirmed by chemical analysis, the only satisfactory mode of ascertaining the nature of these modifications. The noxious influence which, in particular cases, the bile has been found to exert, when introduced into the system of a healthy animal, seem to afford additional proof of its occasional vitiated constitution.

Impeded Excretion of Bile. The bile, subsequently to its secretion, may be prevented from entering the intestinal canal by a variety of mechanical impediments; but the gall-bladder and tubuli biliferi may also become distended with that fluid, without there existing any apparent obstruction to its flow. Some pathological facts seem to countenance the opinion that these latter cases depend on spasms of the ducts, such as that the attacks are frequently temporary, suddenly commencing and suddenly ceasing, and that they occur in nervous and hysterical habits. By some pathologists, however, the occurrence of spasms in the biliary ducts is regarded as a pure supposition (Andral, *Clin. Méd.*, iv. 343), and some imagine that if retention of the bile ever depends on spasm, it is the duodenum, and not the gall-ducts, that is the seat of the spasm. Some attribute the retention of the bile in cases in which the ducts exhibit no mechanical obstruction, to preternatural viscidity of that fluid itself; others think that this viscidity, when it exists, is more probably the consequence of the bile's detention.

When from any cause the bile has been obstructed, it is very commonly reabsorbed into the system, and being deposited in the different textures of the body produces the state denominated jaundice. But cases are recorded, in which a great accumulation of bile has occurred in the gall-bladder, proving its regular secretion, while the evacuations have been destitute of colour, and yet no jaundice has manifested itself. In some instances of this nature, the accumulated bile has even formed a tumour externally, with an evident fluctuation, and such a tumour has been punctured under the idea that it contained purulent matter.

Symptoms of functional derangements of the biliary organs. It is obvious that, in judging of the existence or non-existence of functional derangements of the biliary organs, we must be guided in a great measure by the appearances of the alvine evacuations. It being understood that their qualities, and particularly their colour, are regulated by a due admixture of healthy bile, any changes of this fluid in respect of quantity or quality, may be expected to influence their appearances.

From the characters of the alvine evacuations in cholera and in bilious diarrhœa, these affections have usually been regarded as indicative of an excessive biliary secretion; but of late years, pathologists have been led to suspect that this doctrine rests on insufficient grounds. " I must confess my suspicions," says Dr. Abercrombie, " that the term *bilious stools* is often applied, in a very vague manner, to evacuations which merely consist of their feculent matter mixed with mucus from the intestinal membrane." Mr. Tytler, Dr. Holland, and others, seem to entertain similar views.

The dark or black appearance of the alvine evacuations, usually termed *melæna*, was formerly regarded as depending on vitiated bile. It is now, however, understood that this condition of the stools is generally caused by a morbid exudation from the intestinal mucous membrane. The liability of such discharges to be mistaken for vitiated bile, is increased by their frequent occurrence in structural diseases of the liver, which Mr. Langstaff attributes to a morbid sympathy between the liver and intestines, but which is probably referrible to congestion of the portal venous system. From the appearance, however, which the bile occasionally exhibits in the gall-bladder, it seems reasonable to suppose that, in some instances at least, inky or pitchy stools may derive their characters from that fluid.

Another appearance of the alvine evacuations not unfrequently observed, and supposed to indicate deranged biliary secretion, is that usually designated as green or greenish stools. Some writers on bilious affections attribute this colour to the action of some acid matter on the bile, subsequently to its entrance into the intestinal canal. Several practical writers, however, believe that this apppearance of the evacuations is attributable entirely to a peculiar morbid secretion from the intestinal canal, and that the bile is not concerned in its production. This is a subject which seems to deserve fuller investigation than it has yet received.

When the alvine evacuations exhibit a white colour, this is generally in connexion with the state of jaundice; and may be regarded as indicating the existence of some obstruction to the passage of the bile into the alimentary canal, and its consequent reabsorption. But white stools have also been observed in some cases in which jaundice did not exist. The most probable explanation of the occurrence of white stools in cases of this last description, seems to be, that the blood is deficient in the biliary principles; for if they depended upon functional derangement of the liver itself, the biliary principles would remain in the blood, and give rise to jaundice. Dr. Coe supposes that, in some cases, the white stools depend upon a morbid condition of the bile, by which its yellowness is destroyed, and he alleges that the same effect (viz., white stools) may be produced by the detention of the bile in the gall-bladder, when, from some peculiar

state of the coats of that receptacle and the ducts, or from viscidity of the bile itself, it cannot make its way into the blood.

Treatment of functional derangements of the biliary organs. The foregoing view of the simple functional or dynamical derangements of the biliary organs suggests the following indications of treatment, as applicable to the several forms : 1, to diminish biliary secretion when excessive ; 2, to increase this secretion when deficient ; 3, to correct it when vitiated ; and, 4, to promote the excretion of bile, and the removal of spasm of the biliary passages.

The first indication then to be considered, is that of diminishing the hepatic secretion when it is in excess. Independently of any specific power which is attributed to mercury in this respect,—a matter hereafter to be considered,—it is only by avoiding the occasional causes of increased biliary secretion that this indication can be fulfilled, viz., by avoiding exposure to high temperatures, and by diminishing the quantity of animal food. The efficacy of these measures may depend either upon their modifying the qualities of the blood, or on their removing vascular congestion. If the excessive biliary secretion seems to depend upon a morbid condition of the alimentary canal, it is obvious that the attention of the practitioner should be in the first place directed to its correction.

The second indication, that of increasing the biliary secretion when it is deficient, is supposed to be effected by a class of medicines that have been deno-minated Cholagogues, respecting the exact mode of operation of which a great diversity of opinion exists. The remedy of this kind on which most reliance is placed by British practitioners, is undoubtedly mercury, and we shall afterwards find that its efficacy is supposed to depend, by some, on its possessing a specific power of directly stimulating the biliary apparatus, while others attribute its effects on the liver to its action on the intestinal canal as a purgative.

In connexion with this indication, we may consider the question whether medicine affords any means of counteracting the injurious effects arising from a deficient secretion of bile, so long as this continues. There are obviously two ways in which such a deficiency may act injuriously on the economy. The one, depending upon the absence of bile in situations where it is usually met with, is limited to the function of digestion ; the other, depending on its presence in unusual situations, extends to the general economy, and particu-larly affects the functions of the nervous system.

If we were acquainted with the precise purpose which the bile fulfils in the function of digestion, we should be assisted in judging what aid medicine can afford for remedying its deficiency. Those who suppose that its action consists in correcting acescency, may imagine that its place may, in part at least, be supplied by alkaline remedies. Those who conceive that the bile promotes digestion, by stimulating the peristaltic motions of the intestines, must consider purgative medicines as the proper substitute for its deficiency. Leaving out of view such speculative judgments, and looking only to the results of experience, we find that the most beneficial treatment in cases of deficient biliary secretion consists in, 1, the careful regulation of the diet, so as to render it as easy of digestion as possible ; 2, the administration of bitter tonics ; and, 3, of laxative or purgative medicines, so as to keep the bowels gently open. "The tempo-rary defect of bile," says Dr. Saunders, "may be supplied by various bitters, occasionally united with rhubarb, aloes, and the like."

Whatever may be the purpose of the bile as a secretion, it cannot be doubted, that the formation of this substance is not of less consequence as an excretion that secures the elimination of some principles noxious to the system. When, therefore, the bile either is not secreted, or is re-absorbed after being secreted, have we any means of correcting its injurious effects? Little, we believe, in the way of palliation, is in our power in this respect. In the very small num-ber of cases in which an attack of coma, supervening on jaundice, has been successfully combated, the benefit seems to have been derived from purgatives,

and such applications to the head as are suggested by the apprehension of inflammation of the brain.

The third indication is to correct the biliary secretion when vitiated. The degree of control over the acid or alkaline character of the urine, which has been derived from a more accurate knowledge of the morbid states of that fluid, has excited hopes of similar success, with regard to the vitiations to which the various glandular secretions are subject. It must be admitted, however, that the knowledge we at present possess of the biliary secretion in health and disease, does not enable us to lay down any rational indications for the correction of its morbid conditions, with the exception, perhaps, of the treatment required in cases of biliary concretions, which will be presently noticed.

The fourth indication of treatment which we have specified, is that of promoting the excretion of the bile, and the removal of spasm of these canals, supposing them to be muscular. When the bile is accumulated in its passages, in consequence of the torpor of the powers by which it is naturally propelled, or of some slight mechanical obstruction, the administration of emetics, by calling into action the diaphragm and abdominal muscles, and thus compressing the liver, may effect this indication. When by such means the bile is thrown into the alimentary canal, its easy passage is promoted by the copious use of diluents, with or without laxative medicines. " In general," says Dr. Saunders, " bile is a purgative sufficiently stimulating for its own evacuation, only requiring the assistance of warm water for facilitating its discharge. If, however, in some cases, it irritates without purging, I would recommend the use of small doses of the neutral salts, such as soluble tartar, sal catharticus amarus, and the like, and in all cases they do most good under dilution."

Biliary Concretions, or Gall-stones. As connected with the variations to which the physical and chemical constitution of the bile is subject, we next proceed to the consideration of gall-stones. According to Andral, these concretions may, in respect of their chemical composition, be referred to four heads :— 1. Those composed of the yellow matter of the bile ; 2. Those consisting of the resinous matter ; 3. Those consisting of picromel ; and 4. Those of cholesterine. Chevreul and the late Dr. Turner agree in stating that the most common constituents of gall-stones are the yellow colouring matter of the bile, and cholesterine ; the latter generally predominating, and being sometimes in a state of purity, but sometimes wholly wanting. Sometimes gall-stones contain a portion of inspissated bile ; and most cholesterine gall-stones have inspissated bile for their nuclei.

The formation of calculi consisting of inspissated bile may be dependent either on original spissitude of the secretion, or on its accidental detention in the gall-passages, favouring the absorption of its watery particles. But when cholesterine concretions are formed, we must either suppose that the bile contains this principle in excess, or (as Muratori suggests) that there is a deficiency in the bile of the element on which the solution of its cholesterine depends, viz., soda. Dr. Bright has observed, that concretions of adipocire are frequently deposited in the gall-bladder, in patients labouring under scirrhus.

But besides true gall-stones, concretions composed of phosphate of lime are occasionally found in the gall-bladder. In two instances of this kind observed by Andral, the cystic duct was obliterated.

Gall-stones may form in all parts of the biliary passages. Most frequently, however, their first formation takes place either in the tubuli or in the gall-bladder, and they are subsequently conveyed from these into the larger ducts, where they increase in size. In whatever portions of the biliary passages they are formed, they may be driven onwards, by the flow of the bile, to the gall-bladder or to the duodenum.

The number and size of biliary concretions vary considerably. Sometimes a single calculus fills the whole gall-bladder ; while, in other instances, that sac contains several thousands, of minute dimensions.

It is obvious, that the effects of a biliary calculus as regards the excretion of the bile, must be greatly modified by its situation. If it is lodged in the cystic duct or in the gall-bladder, the bile will continue to enter the duodenum; but if in the hepatic or common duct, the passage into the duodenum will be closed. A small calculus lodged in the ampulla formed by the union of the biliary and pancreatic ducts, may occasion complete retention of the bile, while a much larger calculus lodged in a more dilatable portion of the passages, may allow the bile to pass between it and the parietes of the duct.

Biliary calculi of large dimensions are sometimes voided by stool, or found after death in the intestinal canal. With regard to these, it may be questioned whether the gall-ducts are capable of such distension as to have allowed them to pass; or whether they have acquired their large size subsequently to their reaching the intestines; or whether they have been formed exclusively in the biliary passages, and entered the intestine by some preternatural route. It is not probable that a biliary calculus can receive any addition from the bile after reaching the alimentary canal, though it is conceivable enough that such a calculus may form the nucleus of an intestinal concretion. That biliary concretions sometimes reach the intestinal canal by a perforated aperture of communication, does not admit of doubt; many cases being recorded in which adhesion and ulceration have taken place between the gall-bladder and the duodenum, by which an opening has been effected sufficient for the passage of a large calculus; in other cases, the gall-bladder has in the same manner formed a communication with the ascending colon.

In some cases, biliary concretions are discharged externally, by producing abscess and ulceration of the coats of the biliary passages, particularly of the gall-bladder, and of the parietes of the abdomen. (Soemmering, *De Concrement. Bil. Corp. Hum.* 1795.)

Symptoms. When biliary calculi block up the ducts, they give rise to the train of symptoms comprehended by nosologists under the term jaundice, consisting particularly in yellowness of the skin, whiteness of the stools, and muddy redness of the urine. The state of jaundice, however, may arise from various other conditions of the biliary organs, some dynamical and others structural, as will be afterwards shown, and cannot therefore be held as conclusive evidence of the existence of calculi.

The existence of gall-stones is frequently attended with fits of pain of greater or less intensity, and of longer or shorter continuance; but this is by no means invariably the case. On the contrary, in a large proportion of cases, the existence of biliary concretions remains unknown till revealed by *post mortem* examination. In considering the presence or absence of pain in the hepatic region as a diagnostic character for determining the existence of biliary concretions, it is necessary to keep in mind the three different situations in which these bodies may exist, viz., 1, the gall-bladder; 2, the gall-ducts; and, 3, a passage formed by ulceration between the gall-bladder or ducts, and the intestinal canal.

Biliary calculi may remain in the gall-bladder, without occasioning pain, or any other symptom, and have frequently been found, in that situation, in dead bodies when their existence was unsuspected during life. Sometimes, however, they occasion a dull pain, which may increase on motion or after food, and in some instances the pain is very severe.

The pain which usually attends the passing of a biliary concretion along the gall-ducts, is often intense. It is generally seated in the pit of the stomach, extending to the right hypochondrium and back, and recurring in frequent paroxysms like labour pains. The sufferings of the patient are of the most acute and agonizing description. Intervals of comparative ease succeed these paroxysms, but there generally remains a dull, obtuse pain in the epigastric region, from which those of a more acute character appear to proceed. Of the circumstances influencing the degree of pain which accompanies the passage of a gall-stone along the ducts, the most obvious is the size of the calculus, occasioning

a proportional degree of distension in the biliary ducts; but besides this, it has been supposed that the ducts are capable of spasmodic contractions, in consequence of which intense pain may proceed from the passage of a calculus by no means considerable. When an intense degree of pain occurs in the hepatic region as a consequence of inflammatory action, we may expect it to be accompanied by febrile excitement, a symptom which is not present in spasm of the gall-ducts. Hence, as Dr. Pemberton remarks, the more exquisite the pain is, provided the pulse is below 100 in a minute, with the more confidence may we rely on this diagnostic symptom. The simultaneous occurrence of perspiration affords another presumption that the pain is not the consequence of inflammation. "The severity of the pain is so extreme," says Dr. Bright, in speaking of the passage of gall-stones, "as to bring on a state of the greatest exhaustion, and reduce the pulse below the natural standard, both as to strength and frequency, or still more often to render it rapid and weak, while the hands and the whole surface are bedewed with a cold perspiration."

Where calculi have passed from the biliary passages into the intestinal canal, by perforating their respective coats, there seems reason to believe that the whole of this process has been effected without the production of any considerable degree of pain.

When biliary concretions have found their way into the intestinal canal, they are, in a large proportion of cases, discharged with the evacuations. Cases occur in which all the symptoms of ileus manifest themselves, but abate or cease simultaneously with the discharge of a gall-stone from the intestinal canal. In some fatal cases of ileus from gall-stone, the calculus has been found in the gall-ducts (*Abercrombie*, p. 363); in others, in the intestinal canal (p. 125). Cruveilhier mentions a case, in which one calculus was found in the jejunum (above which, the alimentary canal was distended with a brownish-yellow fluid); and another was fixed in an ulcerated communication between the gall-bladder and duodenum. Sometimes the ileus appears to depend upon an agglomeration of several calculi causing obstruction of the intestinal canal.

Treatment. The indications referrible to this head seem to be the prevention and solution of biliary concretions, so far as these are objects which it is in the power of medicine to promote, and the facilitating their passage along the ducts.

The prevention of the formation of biliary calculi must obviously depend mainly on avoiding the causes of their production. It has been alleged, however, that the long-continued use of alkalies renders the bile less disposed to concrete, and even affects the softening and the solution of concretions already formed.

Those agents which have been found capable of dissolving biliary calculi out of the body, have, at different times, been recommended as proper for internal administration in cases in which gall-stones are supposed to exist. Of these, the medicine which, in its day, acquired the widest reputation, was a combination of sulphuric æther with spirit of turpentine (two parts of the former with three of the latter), administered at first in a very small dose (two scruples). This remedy, originally recommended by Durande, a physician of Dijon, has also been much commended by Soemmering, Richter, and others, who unhesitatingly attribute to it the property of dissolving biliary calculi; while those who do not acknowledge its possessing such a power, admit that the remedy of Durande occasions, or at least facilitates, in certain cases, the expulsion of those concretions; which beneficial operation they suppose it to effect by calming the spasm of the parts containing them. (*Bricheteau.*)

We are next to inquire how the passage of the biliary concretions through the gall-ducts may be facilitated. Our views on this subject must, of course, be influenced by our opinions as to the causes which retard or propel a biliary concretion in its course; whether we suppose the resistance to arise from the physical coherence of the coats of the ducts, or from their spasm; and whether we suppose the power by which the resistance is to be overcome, to be the muscular

contraction of the ducts themselves, as some imagine; or, as is conceived by others, the compression of surrounding parts; or, as has also been suggested, the pressure of a fluid accumulating, by continued secretion, behind the obstacle.

The measures which in practice have been found most efficacious in fits of gall-stone, are the administration of opium, the warm bath, the warm fomentations, emetics, and sometimes blood-letting.

The beneficial effects derived in this class of cases from the administration of opium and other narcotics, has been considered a strong argument for attributing the detention of the gall-stones to spasmodic contraction of the ducts. It has been suggested, however, that narcotics, if they allay spasm, must at the same time put a stop to any muscular power by which gall-stones can be supposed to be propelled. But whatever antispasmodic influence may be exerted by opium upon the gall-ducts, its power in relieving pain is undoubted, and with this intention it must be administered during the fit of gall-stone, and that in very considerable quantity. Dr. Pemberton says that it should be given until the pain abates; and that, till that object is obtained, the patient should take a grain of solid opium, or 25 drops of laudanum, every hour. A starch and laudanum glyster (40 minims of Tinct. Opii in 4 oz. of starch gruel), repeated every six or eight hours, will frequently produce immediate relief.

When the stone is arrested in the biliary ducts, blood-letting may be requisite for the removal or the prevention of inflammation. But the intention with which it is employed in these cases is generally similar to that with which the use of opium and of the warm bath is recommended, viz., to produce relaxation. The quantity of blood to be taken must depend upon the peculiar circumstances of the case.

The administration of emetics during a fit of gall-stone has been recommended, partly on the idea of their contributing to produce muscular relaxation, and partly from their exciting the action of the abdominal muscles, in the manner already alluded to. Among the advocates for their use may be mentioned Dr. Coe, Dr. Heberden, and Dr. Saunders. The latter recommends their employment in small doses, so as to create nausea for some time before their emetic effect is produced. "For the same reason," he observes, " tobacco deserves a trial, as the sickness which it occasions resembles sea-sickness more than any other, and it is probably on this principle that sea-sickness has been so very efficacious in those cases." Dr. Powell's experience is unfavourable to the use of emetics. Dr. Pemberton suggests that " the effect of an emetic is not only to produce relaxation of the whole body, but also to increase the secretion of bile. This increased quantity of bile, if its exit be prevented, will mechanically increase the distension of the duct, and thus will a passage be opened for the calculus. But if the stone, in consequence of its angles, does not completely close the ducts, the bile will pass off, and no distension take place."

When gall-stones give rise to symptoms of ileus, the means to be employed for overcoming the obstructed state of the alimentary canal must be the same as when this state arises from other causes. Indeed, it often happens in cases of this kind, that we are ignorant of the immediate cause of the symptoms, till the case terminates, favourably by the discharge of the concretion, or fatally in death.

DISEASES OF THE BILIARY PASSAGES.

Glands of gall-ducts.—Their enlargement.—Inflammation of the mucous membrane of the
gall-bladder, ducts, and biliary tubuli.—Collections of pus.—Ulceration and perforation of
the gall-bladder and ducts.—Contraction.—Distension of the gall-bladder, various causes
of.—Symptoms and treatment of diseases of the biliary passages.

In this section we shall consider the structural alterations to which the biliary
passages, viz., the tubuli biliferi, the gall-ducts and the gall-bladder are liable.

1. The most common of these is the presence of gall-stones, the composition
and mode of formation of which we have already noticed. We allude to them
at present simply as foreign bodies, occasioning, in the first place, more or less
impediment to the flow of the bile; and, secondly, tending to give rise to more
or less acute inflammation of the biliary passages, in all parts of which these
concretions form.

2. The attention of pathologists has lately been directed by Mr. Twining to
an organic affection which seems to prove not unfrequently the cause of ob-
struction to the bile in its passage to the duodenum, viz., the developement of
tumours, varying in size from that of a grain of barley to that of a bean, in the
capsule of Glisson. "Two small bodies," this writer states, "are always to be
found by careful dissection, which, from their structure, appearance, and uni-
formity of situation, I am inclined to believe are absorbent glands. One of
them is situated near the termination of the gall-bladder in the cystic duct; the
other at the upper part of the ductus communis choledochus. Enlargement of
these bodies, with inflammatory excitement about the capsulæ of Glisson, may
cause closure of the biliary ducts. I have found the ducts obliterated exactly
at the point where these enlarged glands were causing pressure. If my view
of the influence of these parts be correct, we shall have a satisfactory explana-
tion of one mode in which transient obstructions to the flow of bile into the
intestine are produced from temporary irritation of these glands on the occasion
of disorders in the vicinity; and we see a distinct reason for obliteration of the
cystic or of the common duct, in the chronic disease of old drunkards, which is
just the description of subjects in whom the closure of the ducts most frequently
take place."

3. The mucous membrane of the gall-bladder and of the large biliary ducts
is liable to attacks of inflammation, either acute or chronic, occasioning its
vascular turgescence and general swelling from serous or other effusions, and,
when the inflammation is chronic, its more permanent thickening and indu-
ration. The inflammation may either be circumscribed, or it may spread
over the whole inner surface of the ducts and gall-bladder. It has been
alleged that, in these cases, the inflammation spreads from the duodenum into
the biliary passages. May it in any case be derived from, or be extended to,
the substance of the liver? In acute inflammation of the gall-bladder (cho-
lecystitis), the substance of the liver is said to be almost always red; and in
the chronic form of this affection, it is not uncommon to find abscesses or
tubercles and other degenerations in the liver. The mechanical obstruction
produced by inflammation and swelling of the mucous membrane of the biliary
ducts will, it is obvious, affect the flow of the bile, in precisely the same manner
as a calculus occupying the same position.

Inflammation may also occur in the mucous membrane of the smaller biliary
tubuli, and it seems probable that to them, at least, inflammatory action in the
substance of the liver will be readily communicated. Cruveilhier has repeatedly

found cysts containing concrete bile, in the liver of new-born children. He regards these cysts, which he suspects to have been often taken for tubercles, and which may acquire a considerable size, as the consequence of adhesive inflammation of the biliary tubuli.

It very seldom happens that inflammation of the mucous membrane of the gall-bladder terminates in purulent effusion : but in a few cases this has occurred, generally from the irritation of biliary calculi. Ulceration of this membrane may take place as a consequence of the same cause. Sometimes the ulceration consists of simple erosion only. Sometimes it goes on to complete perforation. It may be either confined or extended, or there may be a number of distinct ulcers in different portions of the sac. If perforation occur, without previous adhesion of the gall-bladder to the adjacent parts, the bile is effused into the cavity of the abdomen, giving rise to fatal peritonitis ; but in many cases, such adhesion has taken place before the whole thickness of the coats is destroyed.

The parietes of the gall-ducts, in like manner, may be softened, ulcerated, and ultimately perforated ; and this last event will of course be followed by effusion of bile into the cavity of the peritoneum. The perforation of a gall-duct, as Andral observes, sometimes happens behind a point where the duct is obliterated, either in consequence of disease of its coats or of the lodgement of a gall-stone.

It is probable that many of the morbid alterations to which the coats of the gall-bladder are subject, as, for example, the formation of cartilaginous or bony plates, or of earthy or stony concretions, originate in the sub-mucous or sub-peritoneal cellular coats. Appearances have sometimes been met with, which would lead to the belief that inflammation had had its primary seat in the sub-mucous cellular coat, and either remained confined to that coat, extending over a smaller or larger portion of it, or spread to the membranes on each side. Serous effusions into the cellular inter-coats have been observed to such an extent, as to add considerably to the thickness of the parietes. Louis mentions, that of seventeen cases of diseased gall-bladder which had fallen under his observation, in two the sub-mucous membrane was hard, thick, and scirrhous, in another case it was merely thickened. Whatever be the nature of the coat which is interposed between the sub-mucous and sub-peritoneal cellular membranes in the state of health, it is certain that, in some cases of disease, the existence of muscular fibres in that situation does not admit of doubt : Louis states, that in one of his cases, in which the mucous membrane was destroyed throughout a great extent, there were found beneath the sub-mucous cellular coat, fibres of a muscular appearance, resembling those of the fleshy coat of the stomach ; and Andral notices the appearance of muscular fibres in the coats of the gall-bladder, as one of the changes which it is liable to undergo in hypertrophy.

4. In the healing of ulcerations of the mucous lining of the gall-bladder and ducts, the greater or less contraction of their parietes is liable to occur, producing shrinking in the bladder, and in the ducts stricture or closure, or occlusion, as it has been lately termed. M. Louis mentions eight cases of obliteration of the gall-bladder near its neck. In five, there was more or less affection of the mucous membrane, and in these the gall-bladder was very diminutive, containing a very small quantity of mucus or pus. In the other three cases, the gall-bladder, not having experienced ulceration, was of considerable size, and distended with a fluid resembling the white of an egg. In nine other cases of diseased gall-bladder, there was more or less alteration of the mucous membrane ; and in two of these, its size was diminished. From M. Louis's results, it would appear that the number of cases in which obliteration at the neck of the gall-bladder is accompanied with, and independent of, calculi, is nearly equal.

But diminution of the gall-bladder, besides proceeding from ulceration of its

lining membrane, may, Mr. Twining conceives, arise from inflammation of its external surface.   This author states, that in India, the gall-bladder is commonly distended with bile in persons recently arrived, so as to produce enlargement and deepening of the sulcus in which it is lodged.   As a consequence of this distension, inflammation of its serous surface is induced ; this is followed by effusion of coagulable lymph, which contracting as it becomes organized, ultimately compresses the gall-bladder to less than its natural dimensions.   In many cases, in which inflammation of its serous covering has occurred, the gall-bladder is agglutinated by false membranes to the adjacent part, and membranous bands are sometimes formed between it and the duodenum, that produce considerable constriction of that intestine, and give rise to symptoms which simulate those of organic diseases of the pylorus.   Diminution in the size of the gall-bladder may also rise from other circumstances.   Thus, when from any cause the bile does not reach the gall-bladder for a considerable period of time a diminution of its capacity takes place.   The state of its coats in these cases is very various, sometimes being so soft and thin that they tear on being touched, and at other times thickened, and harder than natural.   It seems to be under circumstances such as have been just alluded to, that the gall-bladder occasionally undergoes what is called a cellular transformation.   Richter found, in the body of a woman who died in a most intense degree of jaundice, that the gall-bladder was wanting, and in its place there was merely a membranous substance, without a cavity, and of the circumference of a sixpenny piece.   And Andral mentions a case in which, a man having died some months after biliary calculi had been discharged externally by an abscess opening in the side, no trace of the gall-bladder could be found ; there being nothing in its sulcus, except a mass of cellular tissue of considerable density.   From the choledoch canal there arose a duct which resembled the cystic, but could not be traced beyond a few lines, terminating interiorly in a cul-de-sac, and losing itself in the cellular tissue.

5. Distension of the gall-bladder may be produced by an accumulation either of bile, or of fluid secreted from its internal surface.   In some instances the bile is accumulated in this cavity, in consequence of some obstruction to its passage into the duodenum ; but in other instances the accumulation occurs independently of such obstruction.   The gall-bladder has sometimes been found to contain twelve pounds and upwards of bile, its dimensions being, of course, proportionally increased.   In such cases the distended gall-bladder extends beneath the margin of the liver, and produces a fluctuating tumour, which can be felt through the integuments.   Such a tumour is apt to be mistaken for hepatic abscess.

When, from impaction of the concretion, or any other cause, the passage of bile from the liver into the gall-bladder is prevented, this receptacle as Dr. Powell observes, is not in general found empty, but distended to about its usual size, or somewhat more, by a thick colourless mucous fluid, which is commonly coagulable by heat, by acids, and by alcohol, and which, except that the coagulum is firmer, very accurately resembles serum.   This fluid is freer from the admixture of bile, in proportion to the duration of the obstruction, and it appears to be the unmixed secretion of the internal surface of the gall-bladder.

A mechanical obstacle to the flow of bile into the intestines may occasion dilatation of the biliary tubuli, more particularly if, from the obstacle being in the hepatic duct, the entrance of the bile into the gall-bladder is prevented.

We have recently alluded to the circumstances under which an accumulation of pus may occur in the gall-bladder, producing its distension.

In a case related by Simmons, a tumour, occupying principally the left side of the abdomen of a woman, was found to be formed by an immense sac, containing sixteen measures full of hydatids of various sizes, which sac proved, on examination, to be the gall-bladder.   Walter also once met with hydatids in the cavity of the gall-bladder.

Several instances are recorded, in which the gall-bladder has been found

greatly distended with air, but we are not aware of this form of pneumatosis having ever been recognised during life.

Symptoms. The symptoms connected with structural diseases of the biliary passages must obviously be such as depend, 1, on the existence of inflammation in the membranes of which these passages consist; 2, on obstruction to the progress of the bile through them; 3, on accumulation of bile or other matters in them; and, 4, on the escape of bile into the cavity of the peritoneum in consequence of their rupture.

The pain which attends inflammatory affections of the membranes of the biliary passages, does not appear to be of a very intense degree, and hence this affection may exist to a certain extent without complaint on the part of the patient.

It is obvious, that where the structural alteration is such as to obstruct the flow of bile into the duodenum, reabsorption will take place to a greater or less degree, and, as a consequence of this, the symptoms included under the term jaundice will arise. The peculiar characters of jaundice, as depending on this proximate cause, will be afterwards considered.

When, in consequence of an accumulation of bile, or other fluid, in the gall-bladder, this cavity becomes considerably enlarged, it extends beneath the margin of the liver, and produces a fluctuating tumour which can be felt through the integuments. Such a tumour is liable to be mistaken for abscess of the liver. The grounds of diagnosis will be mentioned afterwards.

The symptoms which succeed to the escape of bile into the cavity of the abdomen, terminating, after a brief space of time, in death, are similar to those which arise from other substances escaping into it from other cavities.

Treatment. The only indication of practice which we can expect to fulfil in this class of affections, is to reduce inflammatory action when it is present. The means to be employed for this purpose do not differ from those that are applicable in the parenchymatous inflammation of the liver, to the treatment of which, therefore, we refer.

INFLAMMATION OF THE LIVER.

Hepatic Congestion and Hemorrhage.—Symptoms and treatment.—Acute Hepatitis.—Symptoms.—Terminations.—Chronic Hepatitis.—Diagnosis and treatment.

THE parenchymatous substance of the liver, and its investing serous covering, are both susceptible of inflammation, which may commence in, and for a time be limited to, the one or the other of these textures, though, in a large proportion of cases, both become eventually involved. The hepatic inflammation may be either acute or chronic: it has been supposed to partake of the acute character when it is seated in the serous covering; and when it attacks the parenchyma of the gland, to assume the chronic form. This observation may be generally true as regards the disease in temperate climates, but it cannot be applied to it when it occurs in tropical regions, in which acute inflammation of the substance of the liver is by no means infrequent.

Hepatic Congestion and Hemorrhage. Congestion of the liver seems, in most cases, to depend upon mechanical obstruction to the passage of the blood, through either or both of the venous systems with which the liver is provided, to the right side of the heart; whether the obstruction be situated in the portal or hepatic veins themselves, in the vena cava ascendens, in the heart, or even in the lungs. The effect of obstruction in the vena portarum is communicated

to the stomach, pancreas, intestines, &c., as these organs discharge their blood into that vessel.

But congestion of the liver may occur, when no impediment to the flow of the blood can be detected. So occurring, it is sometimes accompanied by increased vascular action, in which case it constitutes what is termed *active* congestion, a state, the relation of which to simple inflammation it is not easy to determine, but which seems readily to pass into it. Sometimes the congestion is unaccompanied with any increase, or is even attended with a diminution of vascular action, as in scurvy, constituting what is denominated *passive* congestion.

In some cases of congestion, the substance of the liver is uniformly red ; but in others it is mottled, red, yellow or white. Those who maintain the existence of two distinct substances in the liver, attribute this mottled appearance to one of those substances undergoing congestion, while the other remains free from it. But Mr. Kiernan and others, who regard the liver as uniform in its structure, explain its mottled appearance by supposing that the congestion may be confined either to the hepatic or to the portal venous system, and that according as it is seated in one or the other, will be the relative positions of the two colours.

The state of hepatic congestion seems sometimes to appear and disappear very rapidly, particularly (according to Andral) when it depends upon diseases of the heart. In whatever form it occurs, it may undergo resolution spontaneously, or from medical treatment; but it may lay the foundation of distinct inflammation, and probably, also, of non-inflammatory alterations of structure.

One of the results of excessive hepatic congestion, is an extravasation of blood. It would appear that this fluid, in some cases, passes through the secreting vessels of the liver into the tubuli biliferi, replacing, or mingling with, the bile, and is discharged by the larger gall-ducts into the intestinal canal. In other instances, the extravasation takes place into one or more portions of the substance of the liver, producing parenchymatous hepatic hemorrhage ; or it may occur immediately beneath the peritoneal coat of the liver. In other cases, the blood escapes by the rupture of the liver (or by mere transudation) into the cavity of the peritoneum. Hepatic hemorrhage, however, may occur without previous congestion, from rupture or ulceration of the larger vessels.

There is a peculiar morbid appearance of the liver occasionally met with in pernicious intermittent fevers, which seems nearly allied to congestion. In these cases, the liver seems to be wholly composed of black blood slightly coagulated, and of cellular filaments which alone offer any resistance to the finger. When this resistance is overcome, the liver is reduced to a gelatinous pulp. An analogous morbid appearance is, as will afterwards be seen, of more common occurrence in the spleen.

Symptoms. In the state of congestion, the liver, being increased in bulk, produces feelings of weight and distension in its seat, and if the congestion be to a considerable degree, it projects beneath the ribs. Jaundice is liable to arise, the characters, as depending on this cause, will be afterwards noticed, as well as the appearance of the alvine evacuations.

With respect to the *treatment* of hepatic congestion, we may in general remark, that it is to be conducted on the same principles as that of the more chronic forms of inflammation of the liver.

Acute Hepatitis. The precursory symptoms of acute inflammation of the liver are very similar to those of gastric fever ; but as the disease proceeds, the local signs which supervene soon indicate its particular nature. The type of the accompanying fever, in its early stage, is generally inflammatory ; but towards the termination of the hepatic inflammation, the febrile symptoms may assume a typhoid character, especially when the disease has been protracted, or the powers of the patient have been enfeebled by previous illness. At the onset of the disease, the skin is hot and dry, the pulse full and often hard, the tongue covered with yellow fur, the patient is thirsty and complains of bitter taste in

the mouth, he feels frequently sick, and occasionally vomits a bilious or dark coloured fluid. The bowels are generally constipated, though often relaxed, and the urine is scanty and of a deep orange colour, and deposits, on cooling, a red sediment.

These general symptoms are accompanied with *pain* more or less severe in the region of the liver, either in the epigastrium, or under the cartilages of the ribs towards the spine, and increased on pressure, deep inspiration, cough, or lying on the right side. The pain is more acute when the peritoneal cover-ing of the liver, or the portion of the parenchyma immediately subjacent, is inflamed.

It is well known, that in hepatic affections, the right shoulder is frequently the seat of sympathetic pain ; a fact of which no satisfactory explanation has as yet been proposed : nor is it well ascertained what are the affections of the biliary organs in which it occurs. Its frequent occurrence in hepatitis has led to the idea of its being a pathognomic symptom of this disease. It is, however, far from being uniformly present in this affection, although, when it does occur, in a case resembling hepatitis in other respects, it may be considered as conclusive of the nature of the disease. But though hepatitis may be the affection in which this symptom is most commonly observed, it does not follow that it is exclu-sively confined to it ; most authors concur in stating that it also accompanies the passage of concretions through the gall-ducts.

It may here be remarked, that, besides the right shoulder, sympathetic pains may also occur, in hepatic affections, in other situations, as between the sca-pulæ, over the right clavicle, or the left shoulder and clavicle. They are some-times observed in the loins and lower extremities. Andral mentions a case of cancer of the liver, in which no pain had been referred to the hepatic region, but from time to time a very painful sensation was experienced on both sides of the chest, that soon extended to the arms and hand. The same author has observed, that in some cases of affections of the liver, the only pain has been in the head ; and this has sometimes been sufficiently intense, constant, and long continued, to fix exclusively the patient's attention.

Considering the intimate relation of the diaphragm to the liver on the one side, and to the lungs upon the other, it is not surprising that the function of re-spiration is sometimes deranged in the progress of the hepatic disease. Of these derangements, the one which has attracted most attention is hepatic *cough*, which occurs not unfrequently in inflammatory affections of the liver, and some-times in diseases not inflammatory, particularly enlargement. Dr. Pemberton mentions, that he never knew cough to occur as a symptom of acute hepatitis till after forty-eight hours from the first seizure, but that at a later period of the disease it is very common. He remarks, that the cough is dry in membranous inflammation of the convex surface of the liver, irritating the diaphragm ; loose when the general inflammatory diathesis increases the bronchial secretion, or when, either by extension from the liver or by community of cause, inflamma-tion of the bronchial membrane accompanies hepatitis. Some suppose that hepatic cough is to be accounted for by the increased weight of the liver, drag-ging down the diaphragm, and stretching and irritating the respiratory nerves. (See *Trans. of Assoc. of Phys. in Ireland,* vol. iii. p. 245.)

Another local sign of hepatic inflammation, is *tumefaction.* According to M. Piorry (*Proc. Operat.*) in cases of hepatitis, or sanguineous congestion, the liver is susceptible of great increase of volume, its dimensions diminishing rapidly after a copious bleeding, or sometimes by strict regimen. The tume-faction is detected by mediate percussion by means of the plessimeter. In using this instrument, it should be applied over the epigastrium, hypochondrium, and also over the lower portion of the chest, both anteriorly, laterally, and pos-teriorly, by which means the extent of the hepatic tumefaction can be generally determined with ease. It is necessary, however, to guard against any source of fallacy, such as the intestines being loaded with flatus or alimentary matters.

The occurrence of *jaundice*, as a symptom of hepatitis, is by no means uniform.   Dr. Stokes thinks that it much more commonly attends inflammation of the duodenum, than that of the liver; but that it is by no means a regular occurrence, even in the former disease.   It is therefore evident, that though yellowness of the skin is occasionally observed, it is not a pathognomonic symptom of hepatic inflammation.

Terminations.   The most favourable termination of hepatic inflammation is, of course, that by resolution.   When this happens, the fever gradually abates, the pain and tumefaction in the hepatic region diminish, the tongue becomes cleaner, the appetite improves, and the countenance assumes its natural colour and expression.

Inflammation of the parenchyma of the liver, when uncomplicated with other disease, rarely proves fatal until it has existed for a considerable time.   Pathologists, therefore, have seldom an opportunity of witnessing the effects of incipient inflammation on the liver, except when hepatitis supervenes on fever or dysentery.   In such cases, the usual appearances of inflammation may be observed, either over the whole surface, or throughout the whole internal structure of the liver, or confined to a single lobe or portion of a lobe.   The surface of the liver is generally more vascular than usual; and this appearance also descends more or less into its substance, which exhibits generally a brownish-red colour. The parenchyma is soft and friable, and congested with blood; effusions of lymph or false membrane cover its surface, by which the organ adheres to the adjacent parts.   When torn, it has a granular appearance, and its colour is brighter and deeper than usual.   (*Annesley*, vol. i., p. 433.)

The effusion of serum into the substance of the liver (commonly designated *œdema* of this organ) has often been observed, but uncombined with marks of acute inflammation.   So long as serous effusion is the only product of inflammatory action, absorption may take place, so as to leave no trace of disease.   It is consequently most frequently in connexion with the other forms of inflammatory effusion, that inflammatory œdema of the liver is met with.

The effusion of coagulable lymph into the substance of the liver, with more or less of serous, but without purulent effusion, seems to occur in chronic cases, or in those which had originally been severe, but which have been partially subdued by active treatment.   This effusion is attended with a greater or less degree of induration and enlargement of the whole organ, or of a portion of it, and particularly of the right lobe.

The formation of pus, and consequently of one or more abscesses in the liver, is a frequent result of inflammation, whether acute or chronic.   From the observation of fatal cases of hepatitis, there is reason to believe that suppuration of the liver commences with softening of one or more small portions of its substance, and infiltration, at those parts, of sero-purulent fluid.   The texture surrounding these softened portions is more vascular than usual.   By the gradual absorption, probably, of the softened portions, and increasing purulent secretion, the extent of the abscess is gradually enlarged.

There is considerable variety in the number and size of hepatic abscesses. Sometimes they are about the size of a filbert, and numerous; in other cases, a single abscess occupies nearly the whole of the liver, yielding sometimes as much as ten or eleven pounds of pus.   From experiments of Mr. Marshall, it appears probable, that during the formation of pus, the liver increases in volume exclusively of the purulent secretion, no doubt, in consequence of sanguineous congestion and effusion of lymph.

The rapidity with which abscesses form in the liver, varies exceedingly; but there is often great difficulty in determining the exact period when the inflammation commenced, so as to calculate the time which intervenes between the first invasion of the disease, and the supervention of suppuration.

In the progress of an hepatic abscess towards the surface, it sometimes, but not always, forms adhesions with the neighbouring parts; when this does not

occur, the contents of the abscess are liable to be discharged, either by its ulcera-
tion or its rupture, into the cavity of the abdomen, giving rise to peritoneal
inflammation of a fatal character. This termination may, it is obvious, occur in
whatever part of the liver the abscess is situated. Even when abscesses,
whether originating in the substance of the liver, or forming on its surface, have
been accompanied by adhesive inflammation, the false membrane by which they
are joined to the neighbouring organs may become ulcerated or ruptured, and
the same effects ensue, as if no adhesion had ever existed.

Hepatic abscesses sometimes form adhesions with the abdominal parietes, and
point externally; in this case, unless opened artificially, they must burst and
discharge their contents. Several cases of this kind are recorded, in which a
cure was effected. The abscess may point at any part of the surface of the body
with which the liver is in contact.

When an abscess occupies the upper or convex portion of the liver, near the
suspensory ligament, and adhesive inflammation occurs on its outer surface, the
diaphragm will form a part of the sac, and its substance be gradually removed
by progressive absorption. In the mean time, the corresponding pleural surface
of the diaphragm may either take on adhesive inflammation, and become attached
to the lung, or it may remain free. In the latter case, when the whole thickness
of the diaphragm is perforated, the contents of the hepatic abscess will be dis-
charged into the right cavity of the chest, producing all the effect of empyema;
the purulent collection in the thorax may point externally, and either undergo
spontaneous rupture, or be opened artificially. But if adhesion take place
between the diaphragmatic and the pulmonic pleura, the abscess will open into
the parenchyma of the lungs, and be discharged, more or less completely, by
expectoration. The size of the aperture in the diaphragm, by which an hepatic
abscess is discharged into the cavity of the chest, or into the substance of the
lung, is sometimes very small. In a case mentioned by Curtis, it was not larger
than a quill. " The matter," says Dr. Pemberton, " either bursts suddenly into
the lungs, by which the patient is instantly destroyed; or it filters through im-
measurably small orifices into the air-cells, and is spit up gradually for many
weeks. This fortunate occurrence may still give the patient some chance of
recovery; but it more commonly happens, that after having been worn down
by continual coughing and hectic fever, he at last sinks under the disease."
Mr. Curtis and Mr. Marshall are of opinion that recoveries under such circum-
stances are extremely rare.

A few instances have been observed, in which an abscess of the liver has
discharged itself into the cavity of the pericardium. (Andral, *Anat. Pathol.*)

In some cases, hepatic abscess is discharged into some part of the alimentary
canal, as into the stomach, duodenum, or transverse arch of the colon. When
the matter bursts into the stomach, it may be discharged partly by vomiting
and partly by stool; when it bursts into the colon, the matter escapes entirely
by stool. When this mode of discharge takes place, the patient not unfre-
quently recovers. It has been alleged that the contents of hepatic abscesses
occasionally find their way into the intestinal canal, through the gall-ducts,
which they enter by a preternatural aperture. Few instances of this kind have,
however, been ascertained by actual dissection. In a case of hydatid abscess,
which occurred to Valsalva, an opening was formed into the biliary ducts, by a
large orifice. The duct was dilated throughout the whole of the rest of its
extent, showing manifestly, as Morgagni remarks, " how it might have received
vesicles from the abscess, and conveyed them into the duodenum."

Occasionally, one and the same abscess opens by several apertures, either in
the same or in different directions, and at several times. In a case mentioned
by Bajon, an hepatic abscess opened first into the lungs, and afterwards into
the intestinal canal; and Dr. Graves has recorded a case, in which an hepatic
abscess, besides opening into the stomach by three perforations, also opened
into the sac of the pericardium. (*Dub. Med. Journ.*, No. xiv., p. 349).

Sometimes, two or more abscesses may reach the surface of the liver, either taking the same or different general directions. Petit mentions a case in which an hepatic abscess was opened, and five months afterwards, when it was healed, the patient had an attack of illness accompanied with purulent alvine evacuations. He died on the fifteenth day of this attack, when there was found an abscess on the concave part of the liver, opening into the colon. In a case related by Drs. Graves and Stokes, the contents of an abscess in the right lobe of the liver escaped into the intestines, but subsequently an abscess in the left lobe burst into the sac of the peritoneum.

More rarely, hepatic abscesses have been found to take other routes than those hitherto mentioned, as, for instance, to open into the vena cava, or into the infundibulum or pelvis of the kidney.

When hepatic abscesses are discharged by nature or art, it frequently happens, particularly when the aperture is external, that the discharge gradually diminishes, and ultimately ceases; and consequently it may be inferred that the cavity is obliterated by cicatrization. Various cases have been recorded, in which fibrous and cartilaginous portions of substance, with radii stretching to a greater or less extent from a common centre, have been met with in the liver, in examinations after death, where there had been reason to suspect the existence of hepatic abscess during life. But to the recognition of these appearances as genuine cicatrices it has been objected, that they have never been met with in the successive stages which a cicatrizing abscess must pass through, previously to the completion of that process.

Besides the progressive absorption attendant on the progress of hepatic abscess, the liver has appeared to be in some cases the seat of ulceration. This process may accompany, or supervene in the progress of abscess, either attacking its inner surface, when it has discharged its contents into the lungs, or destroying the circumference of an abscess that has contracted adhesions with a neighbouring organ.

Does the liver ever become the seat of gangrenous inflammation? There can be no doubt that many cases of softening or dark discoloration of the liver have been erroneously cited as examples of this occurrence. Mr. Annesley says he has never seen a true case of this affection. Dr. Chisholm refers to two cases, in which he supposed gangrene to be induced by inflammation of the liver. In one the fœtor, on opening the abdomen, was intolerable: three-fourths of the liver was destroyed by abscess, and the remaining fourth resembled rotten wood, and crumbled when it was handled. In the other case, the patient died on the fourth day of acute hepatitis. The concave surface of the liver was completely sphacelated, and on the convex was an abscess with adhesion. Mr. Marshall, also, in two cases of dysentery, found abscesses in the liver, containing ill-conditioned offensive pus, with their walls in a state of gangrene. Dr. Stokes has been led, by the consideration of what he conceives to be a case of actual gangrene of the liver, to suspect that it is never the result of inflammation, but that it may be induced by hepatic apoplexy.

We have seen that inflammation sometimes increases the bulk of the liver, by the effusion of coagulable lymph. But in cases of a very chronic character, a diminution of its bulk sometimes takes place; and in some instances of this kind, superficial cicatrices have been observed on the liver, suggesting the opinion that its diminished bulk had proceeded from the previous existence of abscess. But this, it is obvious, would occasion only a partial, not a general, shrinking; and in other cases of diminished bulk of the liver, no appearance of cicatrix can be detected. From the observations of Dr. Saunders it would appear, that though, in cases of this kind, there is an increased density and diminished porousness of the parenchymatous substance of the liver, there is, on the whole, a diminution of the weight of the organ, leading to the inference that it has undergone not a mere compression, but a removal of a portion of its substance.

Chronic Hepatitis. The symptoms of chronic inflammation of the liver are often extremely obscure. In some cases there is nothing to indicate its presence, except a slight derangement of the digestive functions. There is sometimes a sensation of weight, with tenderness on pressure, in the region of the liver. In other cases, digestion is accompanied by pain, oppressive fulness of the epigastrium, and frequent vomiting. The countenance assumes a yellow hue, the bowels are inactive, the patient becomes emaciated and subject to fits of great dejection of mind. Frequent accessions of slight fever, especially in the morning and evening, are not unusual.

The appearances after death, in cases of chronic hepatitis, are far from being of a uniform character. In most cases, the liver is slightly enlarged. Sometimes its density is increased, at others it is softer than natural. It is important to bear in mind, that acute hepatitis sometimes supervenes upon the chronic affection.

Diagnosis. Hepatitis may be distinguished from gastro-enteritis by the character of the accompanying fever, which in the former affection is usually an acute form, while in the latter it is generally of a low typhoid nature. The seat of pain, and the tumefaction over the right hypochondrium, may also assist in distinguishing these affections.

The most difficult diagnosis connected with this disease, is to distinguish it from chronic pleurisy attended with effusion. On this subject Dr. Stokes observes,—" From our experience, we should say that the indication which is the most unequivocal, is drawn from the state of the intercostal spaces. When the side is dilated by a fluid, as in empyema, the spaces are raised to a level with the ribs, or even protruded beyond them, and the side has generally a smooth and rounded appearance. On the other hand, when the dilatation is produced by a solid tumour, such as an enlarged liver, the reverse of this occurs, the pressure being exercised on the ribs, these are pushed outwards, but the intercostal spaces preserve their relative positions with them, and the side does not present any thing of the smooth and rounded appearance which we have described. There are cases, however, where even this diagnosis is not applicable, such as when the patient is fat, the integuments œdematous, or the belly distended by fluid. Under such circumstances the difficulty of diagnosis is extreme." (*Cyc. Pract. Med., loc. cit.*)

Treatment. It seems now to be generally allowed, that whatever assistance the medical practitioner may seek in the treatment of the inflammatory affections of the liver, from the administration of specific remedies, these must be used as auxiliaries to, and not as substitutes for, antiphlogistic measures.

As respects the practice of *general bloodletting* in the inflammatory affections of the liver, it must be conducted on the same general principles as inflammations of other organs. In obscure cases we may be guided as to the extent of the bleeding, by the appearance of the blood. Generally speaking it may be said, that the difficulty of overcoming acute inflammation of the liver, and of preventing it from assuming a chronic character, is a strong reason for the early and vigorous employment of bloodletting. The quantity to be drawn must of course be influenced by the conditions of the patients; and in warm climates, those recently arrived admit of, and require, a more copious detraction of blood than those who have resided in such a climate for some time.

When, from the previous employment of general bleeding, from the constitution of the patient, from the slightness of the attack, or from the stage of the disease, general bleeding seems inexpedient, notwithstanding the continuance of some degree of phlogistic diathesis, great advantage may be derived from *local bleeding.* Some recommend the blood to be drawn from the anus or sacrum, rather than from the region of the liver itself. There can be no doubt that leeches are preferable to cupping, as the pressure of the cupping-glasses, besides being productive of much pain, has a tendency to aggravate the disease. This will be a motive with the practitioner to apply the cupping-glasses, if they are

to be used, to the sacrum, rather than to the hepatic region. The application of hot poultices to bleeding leech-bites, in cases of this kind, is very often advantageous. The propriety of repeating the local, like the general bleedings, must be determined by the particular circumstances of the case.

Notwithstanding the apprehensions of Broussais and his followers as to the effects of *purgatives*, British practitioners hold it as established, that, as antiphlogistic remedies, this class of medicines are next in efficacy to bloodletting; and that, both on account of their beneficial influence on the intestinal canal, and of their utility in lessening the force of the circulation, they should not be omitted in inflammatory affections of the liver. (*Ballingall, Marshall.*) As to the selection of the particular purgative (setting aside at present the claims of calomel), the neutral salts seem to be those most likely to answer the indication. Dr. Saunders thinks that their antiphlogistic effect is enhanced by exhibiting them in a diluted form. Even when calomel is administered at night, it should be followed up in the morning by some other purgative, as some of the neutral salts, the infusion of senna, or castor oil. When these are tardy in their operation, there ought to be no delay in assisting them by the employment of injections.

Mr. Annesley disapproves of the employment of *emetics* in this affection, affirming, that where any inflammation of the liver exists, or even a tendency to it, the acute character of the disease is greatly increased by their administration, although for a short time they may appear to give relief. It is only, therefore, as a test of the existence of inflammatory affection, and of the expediency of adopting a decidedly antiphlogistic treatment, that, in Mr. Annesley's opinion, emetics are to be used in suspected cases of hepatic inflammation.

The use of counter-irritants, and especially of blisters, in the more advanced stages of acute hepatitis, and in its more chronic form, is frequently productive of the most beneficial results. Dr. Saunders says, " Blisters applied to the region of the liver, co-operate very strongly with the views of bloodletting, and therefore, in attempting resolution, recourse should be had to them very early." But Mr. Annesley very properly cautions us against resorting to blisters, until the acute inflammatory symptoms have been previously subdued, otherwise they often tend to prolong the disease; and even in the more chronic forms, he thinks, their use should be preceded by other measures. Dr. Saunders, Sir G. Ballingall, and others, recommend a quick succession of blisters, in preference to keeping them open by means of stimulating ointments; and this is particularly to be attended to in hot climates. As another means of counter-irritation, applicable to the more chronic forms of hepatitis, some practitioners recommend the introduction of a *seton*, or the establishment of an issue.

As a very important part of the antiphlogistic treatment, the necessity of a rigid adherence to a conformable system of *diet* cannot be too strongly insisted upon; a measure which, for obvious reasons, is more directly, if not more forcibly, indicated in the inflammatory affections of the liver, than in those of almost any other organ.

There is, perhaps, no class of inflammatory affections where it is more necessary for the practitioner to guard against having his apprehensions lulled by any apparent or temporary improvement, than in those of the liver. The decline of the more urgent symptoms of acute hepatitis, is no proof of the removal of the internal disease. During this apparent remission, abscesses may form in the liver, and a more uncontrollable disease be established.

With regard to the employment of *mercury* in those affections of the biliary organs which depend on derangements of the circulation, viz., the congestive and the inflammatory, it may be remarked that the beneficial operation of mercury in these cases has been explained on very different principles. By some it has been conceived to depend on its operating primarily on the liver, or on the intestinal canal, as others imagine, and through these upon the circulatory system, whilst others suppose that it operates directly upon the circulatory system

itself, or at least on that portion of the nervous system on which the action of the circulatory system immediately depends.   Dr. Currie attributed the beneficial effects of mercury to its specific power of emulging the biliary ducts.   Rejecting this explanation, Mr. Twining conceives that the efficacy of mercury in hepatitis may be accounted for on the same principle on which its use in the remote stages of other inflammations depends.   These contradictions, of themselves, serve to show the correctness of Dr. Saunders's statement, that " it is a matter of dispute among those who recommend calomel as a specific in liver complaints, whether it acts by purging, or by exercising any local operation on the biliary ducts, or by acting on the general system, and ultimately by salivation ; it being a very prevailing opinion among them," he adds, " that when the system is impregnated with mercury, suppuration of the liver seldom takes place."   Mr. Annesley, however, particularly insists on the difficulty or impossibility of inducing salivation, so long as the inflammatory action is unsubdued, and conceives that the use of mercury, so long as this is the case, favours the formation of abscess.   In these views Mr. Twining fully concurs, " The utility of mercury in hepatitis," says the latter, " is readily admitted, but it is subordinate to venesection."

That the number of practitioners in India, who rely solely upon the mercurial treatment of hepatitis, without the employment of venesection, has in recent times been greatly diminished, we have much satisfaction in believing ; but that they are wholly extinct, must not we fear, be supposed.   Sir. G. Ballingall, in 1818, and Mr. Annesley, ten years later, speak of the prevalence of this mode of practice with unqualified reprobation.   And here it is natural to inquire, whether medical men, in their deliberations as to the expediency of prescribing mercury for inflammatory affections of the liver, ought to be influenced by the climate in which they may chance to practise.   Does the hepatitis of India, in particular, require this remedy more than that of Britain ?   It has frequently been maintained, that the hepatitis of India is an essentially different disease from that of temperate climates ; and that the therapeutical maxims applicable to the one, cannot be relied on in respect to the other.   Considering the recent progress which has been made in approximating the treatment of other inflammatory affections in India, to that which is followed in this country, we suspect that time and experience will show that there is no fundamental difference in the practice required for the inflammatory affections of the liver in these two regions.

Is mercury to be used when hepatic inflammation has passed into the state of suppuration ?   We have already noticed the opinion, that when the system is brought under the influence of mercury, as indicated by salivation, suppuration will not occur.   The converse of this proposition has been asserted by some authors, as by Mr. Marshall, who says that when the liver contains an abscess, he suspects no quantity of mercury will cause ptyalism.   Mr. Annesley makes a similar statement, and grounds upon it his recommendation to desist from the use of mercury when hepatic abscess is suspected.   Drs. Graves and Stokes, and Mr. Malcolmson also, bear witness to the same fact, of the impossibility of producing salivation during the continuance of suppuration.

Upon the whole, it would appear, that, according to the best authorities of the present day, the proper period in inflammatory affections of the liver, for commencing the use of mercury, is after the violence of the attack has been in a great measure subdued by the ordinary antiphlogistic remedies.   Exhibited at this period of the disease, it has been supposed, by some of the most experienced authors, to remove accumulations of acid bile, to diminish sanguineous congestion, and to obviate the tendency to chronic inflammation, which frequently remains after the acute symptoms have subsided.   (*Saunders, Marshall, Annesley.*)   Whether these purposes might not be equally effectually accomplished by other means, is a question that could only be ascertained by very cautious

trial in a considerable number of cases, and on which we do not feel ourselves entitled to offer a judgment.

But if medical practitioners differ as to the indications which mercury is intended to fulfil in the treatment of hepatitis, scarcely less do they differ as to the mode of its administration; as to whether the system ought to be brought under its influence, according to the technical phrase, by small doses, repeated at short intervals for a considerable length of time, or by larger doses, administered at more distant intervals. Mr. Curtis generally employed gr. iij of calomel, with gr. iv of soap and rhubarb every night and morning (6 gr. of calomel per day); and if it was thought necessary to have the mouth soon affected, he caused a drachm of mercurial ointment also to be rubbed in along the side every night. " After the mouth became sore, the mercury was repeated in small doses, for two or three weeks, or until every symptom of the disease had disappeared." To this mode of practice, which has been very generally followed by other Indian practitioners, Mr. Annesley is decidedly hostile. To him it appears, that to induce the mercurial excitement of the vascular system, indicated by slight soreness of the gums, and to exhibit mercury or calomel in small quantities frequently repeated with this view, is to keep up a slow inflammatory action in the secreting substance of the liver, which may terminate in abscess; whilst if the full operation of mercurial remedies be speedily induced, and ptyalism becomes abundant, a derivation from the seat of the disease is occasioned to the mouth and salivary glands, the disease of the liver speedily subsides, and the functions of the organ are restored to their healthy state. When the use of calomel is clearly indicated, therefore, it is most beneficial, according to Mr. Annesley's experience, in large doses, with the intervention of generally not less than twentyfour hours between the administration of each dose. He recommends gr. xx of calomel to be given at bedtime, and a purgative in the morning, by which plan he says a much smaller quantity of mercury is required for salivation than when smaller doses, frequently repeated, are prescribed. The smaller doses, he adds, are also apt to induce irritability of the bowels, which the larger dose has a tendency to subdue. Dr. Chapman, on the contrary, thinks that small doses are most beneficial. " When calomel is too largely exhibited as an evacuant," he says, " our purposes are frustrated by the ultimate overwhelming of susceptibility, leaving the alimentary canal and liver in the torpor of direct debility, or inducing a pernicious state of irritation, or positive phlogosis, with an irregular febrile movement." Dr. Malcolmson also regards the practice of administering large doses of calomel in hepatitis as extremely pernicious.

When we come to inquire into the objects contemplated by practitioners in the administration of mercury in the more chronic and structural diseases of the liver, it is no longer the mere regulation of the secretion or excretion of the bile, nor the diminution of the force of the circulation, that are assigned as the motives for its employment; but it is to promote the absorption of the morbid depositions. Of the power of mercury in stimulating the absorbent system, many familiar illustrations might be quoted, as the disappearance of dropsical effusions, under its administration alone, or in combination with diuretic medicines; the removal of the lymph effused in iritis; the diminution of indolent enlargements of absorbent and secretory glands: but these are salutary changes which nature frequently accomplishes for herself, or with but little assistance; and it may be fairly questioned, whether any of the structural alterations of the liver, not of an inflammatory character, which do not undergo spontaneous resolution, ever disappear under, or in consequence of, the administration of mercury. At all events, the prejudicial operation of mercury in the chronic structural affections of the liver, is recognised by a number of high authorities. Mr. Thomas Clark mentions, that he had frequently known very bad effects produced in liver diseases, from the two violent operations of mercury. " Nay, it has often appeared to me," says he, " that even when it has removed the disease in the first instance, it has laid the foundation for a relapse which

proved fatal. The excessive debility occasioned by a violent mercurial course, readily accounts to me for such consequences." Dr. Dick, whose experience in liver complaints, both in India and in England, was very extensive, also notices the great liability of these complaints to return, when treated with mercury. Nor is the view taken by Drs. Pemberton and Saunders of the effects of mercury in this class of cases, more favourable.

To those who participate in the opinion we have ventured to express of the injurious effects of mercury on the economy, even when very cautiously administered, and who at the same time are impressed with the belief that the affections of the biliary organs require *specific* remedies for their treatment, it cannot but be gratifying to find in how high estimation the nitro-muriatic acid, as it has been called, exhibited both internally and externally, is held by Indian practitioners in the treatment of these diseases; and how closely the physiological effects of this remedy are conceived to correspond with those of mercury. This medicine was first used as a substitute for, or as an adjuvant to, mercury, by Dr. Helenus Scott, who printed a paper on the subject in 1796. He at first administered the remedy internally, but although satisfied with its general effects, he found that this mode of using it was attended with considerable inconvenience. He found, however, that a bath of this acid sufficiently diluted with water, produced equally agreeable results, and he subsequently ascertained that merely sponging the skin with a wash of this kind was not less efficacious. (*Med. Chir. Trans.*, vol. viii.) Dr. Scott is convinced that the very same effects arise from a diluted solution of chlorine in water, as from nitro-muriatic acid; an opinion since adopted and supported by Mr. Wallace of Dublin. Sir James M'Grigor tried the nitro-muriatic acid, in India, in about 200 cases of dysentery and hepatitis, and with very general success. "One fact," says Sir James, "we are clear and decided in,—that the injury to the constitution is infinitely less from the acid, than from the mercurial ointment; and that men are not half the time convalescent from the first, that they are from the last remedy." In the medical sketches of the expedition from Egypt to India, published in 1804, Sir James again alludes to the use of nitric acid, as a practice, from which, on a large scale, for the preceding six years, he had observed the best effects, and which he considered likely to become general in India. These anticipations seemed to have been in a great degree realized. Mr. Annesley says, "There are very few remedies which are more deserving of notice than the nitro-muriatic acid wash, and the internal use of nitric acid, in cases of acute hepatitis, after active depletions and mercury have been used. They promote the return of strength, and the healthy establishment of the biliary secretions, and if deobstruent laxatives, with suitable regimen, be prescribed, and adhered to during their use, they remove obstructions, and promote a free circulation in the vessels of the liver. As a restorative of the energies of the system, after mercurial courses, they have generally proved beneficial in our practice, particularly when conjoined with the cautious exhibition of gentle tonics, with light but nutritious diet, and suitable regimen."

Taraxacum has enjoyed considerable reputation in the treatment of chronic diseases of the liver. Of this remedy it may be said, that if it has not been the cause of all the good which has been ascribed to it, its employment is not attended with the same risks as that of some more active substances. Boerhäave entertained a very favourable opinion of its efficacy in the removal of biliary calculi. Dr. Pemberton states, that he has seen the most decided advantage from its use in the treatment of chronic hepatitis, as well as of incipient scirrhus (induration) of the liver, and in chronic derangements of the stomach. He recommends a pint of the infusion to be taken daily in divided portions, the infusion being made by adding a quart of boiling water to ten fresh plants, root and leaf, and straining off the liquor as soon as it is cold.

We have now to offer a few observations on the measures proper to be pursued when hepatic abscesses find their way to the surface of the body.

Different practitioners have given very different estimates of the success which has attended the artificial opening of hepatic abscesses. In the practice of some, it appears to have been eminently successful; while in that of others, the results have been invariably fatal. The circumstances which appear most favourable to the success of this operation are the following :—1. The abscess being confined to the investing membrane of the liver, without involving its parenchymatous structure.   2. The abscess being single and of small size, whether it be confined to the membrane or seated in the substance of the liver. 3. The existence of adhesions between the abscess and the abdominal parietes, by which the discharged matter is prevented from escaping into the cavity of the abdomen.   4. Redness and prominence externally, over the seat of the abscess, both because these circumstances are supposed to imply that adhesion has taken place, and also because they indicate a condition of parts in other respects favourable.   5. The patient being young, and of sufficient strength to bear the shock of the operation.   On the contrary, when the abscess is deep-seated, when it is of a great extent, or when it is not surrounded by adhesions, and when the patient is advanced in life or greatly emaciated, an unfavourable termination may be looked for.

Two modes of opening hepatic abscesses have been recommended, as calculated to increase the chance of adhesions taking place previously to the discharge of their contents.   One of these is the application of caustic potash; the other, suggested by Dr. Graves, is that of making an incision of some length through the integuments, over the most tumid parts of the hypochondrium, dividing some layers of muscle, and keeping the wound open by plugging it with lint. Most authors, however, agree in stating that neither of these methods can be depended upon; and, in many cases where they have been had recourse to, it has been found, in post mortem examinations, that the desired adhesion had not been formed.   It is objected to the mode of opening hepatic abscesses by caustic, that it is so tedious a process, that before the object is effected, the abscess may have enlarged to a fatal amount. It has been found, however, that abscesses of the liver, like those of more superficial origin, may be absorbed under the application of caustic. Dr. Dick told Mr. Abernethy and Sir C. Bell, that in his practice in India, having under his care a case of abscess of the liver pointing outwards, he wished to open it gradually, and for this purpose had applied caustic; but instead of finding that he attained, in any degree, his object of opening the abscess, he soon discovered that it was lessening, and that its walls had become much thickened.   In short, the matter was absorbed, and the patient restored to health.   Other cases of similar success followed, and he was thus led to consider severe counter-irritation as a most advantageous means of producing the absorption of matter.   (*Treat. on Dis. of the Liver*, by G. H. Bell.)

When we are not deterred by any doubts respecting the existence of adhesions, from giving immediate vent to the contents of an abscess, ought we to prefer, for effecting this purpose, the abscess lancet or the trochar ?   To the use of the latter instrument, Mr. Annesley objects, that the pus which is formed in abscess of the liver is often full of large flakes, and sometimes contains coagulated clots of a cheese or curd-like matter, which will not pass through the largest trochar, the more fluid portions only coming away.   These clots remaining may act as foreign substances, in promoting suppuration of the organ, and febrile excitement of the system.   The following is the method of opening hepatic abscesses, which he has been in the habit of pursuing :—" Having made the external incision large, and with caution, until the peritoneum is fully exposed, the fluctuation of the abscess will be distinctly felt.   An abscess lancet should then be introduced, and the tumour laid open to the full extent of the external wound, which ought to be from two and a half to three inches in length.   Care should always be taken that the opening do not extend beyond the limits of the adhesions which have been formed.   The purulent collection being fully evacuated,

the cavity should be filled with lint, which gives a mechanical support to the excavated parts, and the wound dressed with compresses and bandages in the usual way."

STRUCTURAL DISEASES OF THE LIVER.

Serous cysts and hydatids.—Adipose degeneration.—Tubercles.—Malignant formations.

1. *Serous Cysts and Hydatids.* Under the term hydatid, pathologists have frequently included two morbid changes of structure, which are, in reality, very distinct; 1, a collection of watery fluid contained in a cyst, the inner surface of which exhibits the general character of serous membranes, the outer surface being either adherent to the substance of some organ in which it is more or less imbedded, or covered with a layer of condensed cellular substance of greater or less thickness; 2, a cyst of the same general characters as the preceding, but containing within itself one or more detached cysts, which are supposed, from various circumstances, to be distinct animals, or what are now generally designated *entozoa*. As it is desirable carefully to discriminate between these two kinds of morbid alterations, the former may be denominated serous or watery cysts, and the latter, hydatid cysts; or, from the genus of hydatid entozoa, which cysts of the latter description are found to contain, they may be called *acephalocyst* cysts. Both these forms of cysts are met with in the liver.

The watery or serous cysts may be found on the edge or surface of that organ, or more or less completely imbebbed in its substance. How they take their origin, whether by the expansion of a cell naturally existing, or by an entirely new production, is not understood. But, having once commenced, they may attain very considerable dimensions. They are sometimes single, but sometimes several coexist.

When a cyst of this kind is not wholly imbedded in the parenchyma of the liver, the distension of its parietes may, in the progress of its developement, be such as to occasion its rupture, and the consequent discharge of its contents into the cavity of the abdomen. There seems reason to believe, that in particular circumstances, serous cysts connected with the liver take on inflammation of their inner surface, which may terminate in suppuration, so as to convert their cavity into an abscess.

There is no organ so subject as the liver to the developement, in its substance, of acephalocyst cysts: their number may range from one to four, the latter being the greatest number that Cruveilhier has ever met with. The number of hydatids, contained within each such cyst is very various. Cruveilhier states, that the multiple, or fruitful, acephalocyst occur much more frequently in the liver, than in the solitary or barren one. It sometimes happens, that the inner surface of an hydatid cyst suppurates, and its cavity, instead of its usual contents, becomes filled with a mixture of pus and dead hydatids.

In the gradual enlargement of an hydatid cyst of the liver, suppurated, or not suppurated, its contents are liable to the same contingencies as those of an abscess of that organ. It may be ruptured either from external violence or spontaneous developement, and its contents discharged into the cavity of the peritoneum; or, the cyst forming adhesions with the abdominal parietes, its contents may escape externally; or, in the event of its adhering to the diaphragm, they may enter into the cavity of the chest, or into the lungs; or, if the adhesion shall be to some portion of the alimentary canal, the contents may be vomited or voided by stool.

In the liver of sheep, and of many other animals, there is very frequently found a species of entozoon, popularly known under the name of the liver-fluke, the *distoma hepaticum* of naturalists. This, and another species of the same genus, have, it is alleged, in some few instances, been discovered in the human subject; but this occurrence must be regarded as exceedingly rare.

It occasionally happens, that one or more intestinal worms are met with in the biliary ducts, or perforating the substance of the liver, but they are generally supposed to have passed into these situations subsequently to the death of the patient. Some pathologists, however, have concluded that the migration must occasionally be effected during life, because, in some cases, no other morbid appearance can be detected sufficient to account for the fatal issue, or for the symptoms by which it was preceded. Two obstacles to the entrance of intestinal worms into the biliary ducts, during the life of the patient, have been suggested: 1, the bile, as being an element in which it is conceived intestinal worms could not live; and, 2, the irritability of the ducts, and of their intestinal orifice.

2. *Adipose Degeneration*. A very remarkable, but not very uncommon, structural alteration of the liver, consists in the deposition of fatty matter throughout its substance. A liver that has undergone fatty degeneration, as Dr. Addison remarks, exhibits a pretty uniform and highly characteristic appearance. It is of a cream or pale-yellow colour, figured irregularly with brownish or deep orange spots. It is usually, though not always, more or less enlarged, and sometimes very considerably so. Internally, it has somewhat a corresponding appearance, excepting that the brown and pale-yellow tissues are much more uniformly distributed internally, than upon the surface. It is sometimes softer, and more readily crushed between the fingers, than is the healthy liver; sometimes, however, it is firmer than natural, and occasionally of a scirrhous, or almost horny hardness.

The presence of fatty matter in the liver is manifested by the unctuous feel which it communicates to the fingers; by the greasiness of the knife with which it has been divided; by the stain which it imparts to bibulous paper; by the exudation of oil, when a portion of its substance is exposed to dry heat, as in the flame of a candle, or is immersed, in thin slices in boiling water. It is uncertain whether the oily or fatty matter is, in all cases of exactly the same nature. In a case, in which the fatty matter amounted to one-twentieth part of the substance of the organ, Mr. Bird found it to consist of a soft brownish fat, very fusible, and possessing a peculiar unpleasant odour; and in another case, in which it constituted the greater part of the substance of the organ, Dr. Bostock found it to be generally similar to tallow in its chemical properties. There seems reason to believe, that in proportion as fatty matter is deposited, the proper substance of the liver is removed. We do not know to what extent this substitution may go on, but, from the analysis of Dr. Bostock, it would appear, that the greatest part of the organ may be replaced by fatty matter.

3. *Tubercles*. One of the most common structural alterations of the liver, in temperate climates, is that described by Dr. Baillie under the name of the common tubercle of the liver, and which is at present generally recognised under the designation of the granular state of the liver. " The tubercles which are formed in this disease" (says Dr. Baillie) " occupy generally the whole mass of the liver, are placed very near each other, and are of a rounded shape. They give an appearance, every where, of irregularity to its surface. When cut into, they are found to consist of a brownish or yellowish-white solid matter. They are sometimes of a very small size, not larger than the heads of large pins, but most frequently they are as large as small hazel-nuts, and many of them are sometimes larger. When the liver is thus tuberculated, it feels much harder to the touch than natural, and not uncommonly its lower edge is bent a little forward. Its size, however, is not larger than in the healthy state, and I think it is often smaller. If a section of the liver be made in this state, its

vessels seem to have a smaller diameter than naturally. It very frequently happens that, in this state, the liver is of a yellow colour, in consequence of bile being accumulated in its substance. This," Dr. Baillie adds, " is the common appearance of what is generally called a scirrhous liver, but it bears only a remote resemblance to scirrhus in other parts of the body. I should therefore be disposed to consider it as a peculiar disease affecting that viscus."

Various opinions have been entertained as to the nature of this structural alteration. By some it has been regarded as depending on an entirely new formation ; whilst others suppose it to be produced by an irregular developement, and more particularly by an excessive growth, or hypertrophy, of the natural substance of the liver, or of a portion of it.

Laennec agrees with Dr. Baillie in regarding these granulations as a peculiar disease affecting the liver, and in reference to the yellow colour, he proposes to apply to this morbid texture the name of cirrhosis. " In proportion," he says, " as the cirrhoses develope themselves, the texture of the liver is absorbed, and often disappears entirely ; and in all cases, a liver which contains cirrhosis loses in size in place of increasing proportionally."

M. Bouillaud seems to have been the first writer who maintained that these granular bodies are not referrible to a texture of new formation, but depend on a dissociation or disgregation, according to his own phrases, of the two natural elements of the liver, viz., the acini, or yellow element, and the vascular network, or brown element. Its first stage he conceived to consist in an increase of the extent of the vascular network, caused by habitual sanguineous congestion ; and its most advanced, to consist in the obliteration of this network. Andral has adopted the same views with Bouillaud, stating that these granulations are merely a result of hypertrophy of the white substance of the liver ; and that there is no need of admitting, with a view to their explanation, the production of any new texture. The red substance may at the same time remain of its natural amount, or it may increase or diminish in bulk ; and on this circumstance depend, according to Andral, the variations, in bulk and other physical qualities of the liver in the state of granulation.

Cruveilhier attributes cirrhosis to atrophy of the greatest number of the granulations, with a considerable developement of those that remain, but without any disorganizing process ; and lastly, Dr. Hope concludes from his examinations, that granulations consist not in mere hypertrophy of the white (or yellow) substance, but in an interstitial deposition in that substance, connected with a lesion of secretion.

4. *Malignant Formations.* In a large proportion of the cases, in which any of the forms of new growth to which pathologists apply the term malignant (comprehending the various modifications of scirrhous, cancerous, encephaloid, hæmatoid, and melanose tumours), is met with in the liver, post mortem examinations show that it exists likewise in other organs or textures. And it is probable that, in a great number of cases, its developement in the liver, is posterior to its appearance in the other parts. It occasionally happens, however, that the liver is the first and only organ in which these malignant formations occur.

Whether cancer of the liver occur as a primary or as a secondary disease, it may be limited to a single point, and spreading from this, attack the contiguous parts in succession ; or it may be developed in a number of different points of the organ at the same time. Consecutive cancer limited to a single point may arise from contiguity of texture. Thus, as Cruveilhier remarks, it is not uncommon for cancer of the small curvature of the stomach to attack the lower surface of the liver,—which, having become intimately united to that curvature, replaces the parts of the stomach that have been destroyed,—in such a way that the liver may be removed, by successive layers, from its concave to its convex surface. But, most commonly, cancer of the liver, whether primary or consecutive, developes itself in a great number of points, leaving the inter-

mediate parts untouched. This constitutes what has been called by Cruveil-
hier cancer of the liver in disseminated masses; and it is to this form of can-
cerous disease that the remarks we have now to offer principally apply.

When cancer of the liver occurs in disseminated masses; a large proportion
of these masses (Cruveilhier says sixteen out of twenty) are observable on the
surface of the organ, from which they project in a greater or less degree, so as
to produce a corresponding number of prominences of different sizes, which
represent portions of a spheroid. As these tumours enlarge, each spheroidal
prominence becomes hollowed out towards the middle, by a cup-formed depres-
sion. These physical characters of cancerous tumours of the liver are of prac-
tical importance, because they can frequently be recognised through the parietes
of the abdomen, so as to lead to a knowledge of the nature of the disease. The
cupping in the centre which they undergo, Cruveilhier attributes to an increase
in the density of the sub-peritoneal cellular tissue at the corresponding point.
We have sometimes noticed, in dividing a liver affected in this manner, that in
one direction the section exhibited a number of distinct tumours; whilst, when
made in another direction, it presented the appearance of a uniform and conti-
nued morbid growth.

The number of points in which cancerous matter is deposited, is very
different, varying from one or two, to several thousands; and there is an equal
diversity as to the size of the masses; but in general it may be said that their
size is in the inverse proportion of their numbers. From the size of a millet-
seed, to that of the head of a child at birth, they may be found in every succes-
sive stage of enlargement, not only in different cases, but in the same identical
organ.

In some cases, malignant tumours developed in the liver, exhibit to the eye
of the anatomist very characteristic appearances, so that their precise nature can
be immediately determined. Thus, melanotic tumours have been frequently
found in the liver, among various other organs infested by them. In other
cases, the diseased substance has so much the appearance of brain, as to esta-
blish its identity with the tumours termed encephaloid. In others, it assumes
the hæmatoid character; in which event, fungi may protrude from it either
externally, or into cavities formed in its substance; in other cases, the morbid
structure exhibits the usual characters of scirrhus. It must be acknowledged,
however, that no inconsiderable number of malignant growths occurs in the
liver, which we do not find it easy to refer to any recognised form of structural
alteration.

M. Cruveilhier recognises a hard and a soft variety of the disseminated can-
cerous masses of the liver, differing from one another, as he conceives, 1, in the
web, which is cellular and loose in the soft, but dense and fibrous in the hard
variety; 2, in their degree of vascularity; 3, in the greater or less quantity of
cancerous juice with which they are penetrated; and, 4, in their progress and
developement, which is in general slow in the hard tumours, and rapid in the
soft ones. It is, however, probable that the hard variety sometimes changes
into the soft: at least, they are frequently met with in the same liver, and they
may both undergo a disorganizing process, which has for its result the secretion
of pus, the production of a tubercular or gelatiniform matter, and the conversion
of the mass into a pulp (*bouillie*) or gangrene.

The relation between the morbid masses (in disseminated cancer of the liver)
and the natural substance of the organ, is very different in different cases.
MM. Bayle and Cayol allege, that in cases of this description the liver is always
enlarged; its size and weight being sometimes doubled or trebled by the effect
of the disease. In this case, they add, it usually fills the epigastric region, and
extends into the left hypochondrium. Its inferior border descends to near the
right iliac crest, and its convex surface pushes the diaphragm back on the chest,
as high as the fifth, or even the fourth rib. M. Cruveilhier has, however,
observed, that in some of these cases the liver is atrophied either partially or

generally. In some instances he has found the substance of the liver reduced to the sixth, or perhaps even to the eighth part of its natural amount.

Cancerous tumours of the liver are sometimes seated so that they compress the sanguiferous vessels: M. Cruveilhier is inclined to attribute some cases of atrophy of the liver to obstruction of its nutritive vessels being produced in this way. It is probable that the compression which these masses exert on the venous system, contributes, at least, to the production of the ascites and ana-sarca, which attend particularly the advanced stages of this disease; and it is well ascertained that the jaundice, which so frequently occurs in this form of disease, is the consequence of the compression of the larger excretory gall-ducts. M. Cruveilhier affirms, that he has never observed cancer of the liver accompanied with jaundice, without finding the cause of it in a compression of this kind.

Symptoms and diagnosis. There are some symptoms which are not pecu-liar to one disease, or to one class of diseases, of the biliary organs, but com-mon to several of these diseases, and these even of different forms, as, for example, dynamical and structural. These symptoms it is necessary to consi-der, in respect of the more minute variations which they exhibit, according to the internal morbid condition from which they arise. The principal are, *tumour; yellowness of the skin,* or *jaundice, with the characteristic appearance of the alvine evacuations and urine; pain; cough; dropsy; and hæmorrhage.*

1. In the diagnosis of diseases of the biliary organs, it is a matter of primary importance to ascertain the existence or non-existence of *tumour* or *swelling* in the hepatic region; and in the event of its existence, to determine the characters of the swelling. To a certain extent, simple inspection may suffice for this purpose, but manual examination is essential to accuracy of diagnosis.

In proceeding to conduct a manual examination for the detection of tumour, or enlargement of the liver, the patient should be laid on his back, with his legs flexed on his thighs, and his thighs flexed upon the abdomen. Even with the greatest precaution the examination may excite pain, and cause the abdominal, and particularly the recti muscles involuntarily to contract, so as to render it impossible to ascertain the condition of the interior of the abdomen. With the hand not employed in the manipulation, the right false ribs and side should be raised, and the body should be put in such a position, as will favour the descent of the liver into the abdominal cavity.

In conducting an examination of this kind there are several circumstances to be kept in mind, as a neglect of them might lead to an erroneous judgment. Thus, 1. Protrusion of the sharp edge of the liver beneath the costal parietes may be the effect, not of its enlargement, but merely of its displacement, from disease in other parts. 2. Tumours connected with other organs, as with the stomach, the duodenum, the pancreas, or even with more remote parts, may, from their position, be mistaken for enlargements of the liver. 3. It is also necessary to remember, that enlargement of this organ may be either general, all its parts being equally affected, or portions of it may undergo enlargement separately: consequently, the circumstance of a tumour being limited to the right or left hypochondrium, or to the epigastrium, is not sufficient to disprove its being seated in the liver.

When the existence of a tumour in the hepatic region has been satisfactorily ascertained, the next point is to discover whether it consists of solid or of fluid matter. This, of course, is to be determined by the degree and nature of the resistance, or by the sensation of fluctuation, which it gives upon pressure.

The diseases connected with the biliary organs, which produce a fluctuating tumour, are, hepatic abscess, serous or hydatid cyst, and distension of the gall-bladder, whether with bile or with other fluid. M. Petit, many years ago, pointed out the following grounds of diagnosis between hepatic abscess and dis-tension of the gall-bladder. 1. The tumour of hepatic abscess is not circum-

scribed, but appears merged in the neighbouring parts, and as it were lost in the integuments, which are usually œdematous, whilst that produced by swelling of the gall-bladder is exactly defined and distinct, being seldom accompanied with œdema. 2. The tumour from distension of the gall-bladder is always situated beneath the false ribs, under the rectus muscle; but that depending on abscess of the liver is very variable in situation, and may occupy any part of the epigastric region. 3. There are several points of difference in respect of the fluctuation from these swellings. In distension of the gall-bladder the fluctuation appears suddenly, and its existence is unequivocal from the commencement, and is almost as manifest in the circumference of the tumour as in its centre; and after the subsidence of inflammation, it is not surrounded with any degree of hardness. In hepatic abscess, on the contrary, the fluctuation comes on slowly, and is with difficulty detected. It appears, at first, only in the centre of the tumour; and, as suppuration increases, gradually extends to the circumference, and the tumour is always surrounded by hardness and swelling.

The tumour resulting from the projection of a serous or hydatid cyst upon the surface of the liver, usually elevates a portion of the abdominal parietes, so as to be perceptible on simple inspection. Its great degree of resistance, and its great elasticity, may lead to the recognition of a tumour depending on this cause.

In respect of solid tumours occupying the hepatic region, the first question is to determine whether they belong to the liver. If the mass can be traced under the cartilages of the ribs, the presumption is strongly in favour of the liver being the seat of the disease. Hepatic enlargements, also, are necessarily fixed in their positions, whilst most of the tumours that simulate them admit of a greater or less degree of motion.

It being established that a solid tumour is connected with the liver, the next object is to ascertain its more particular nature. Under favourable circumstances we may, in some degree, determine the nature of the tumour from its hardness, its smoothness, or its more prominent inequalities. In enlargements from congestion or inflammation, the surface is smooth, without prominence or depressions. In granular enlargements, numerous inequalities may occur, in consequence of unequal developement. In enlargement from cancerous masses, numerous prominences, raising the parietes of the abdomen, may be felt; but when softening occurs in these masses, says Andral, each elevation is succeeded by a depression. The degree of permanence of the swelling may likewise assist our diagnosis. When, for example, it comes and disappears suddenly, we may infer that it depends upon congestion.

It must be borne in mind, however, in speaking of tumour as a symptom of liver disease, 1st, that all the affections of this organ (as Andral remarks) may pass through the successive periods of commencement and increase, without producing any apparent swelling; and, 2dly, that it is sometimes difficult to detect enlargement, even when it exists; particularly when considerable effusion has taken place into the peritoneal cavity, or when the large intestines are distended by fæces or wind. The operation of paracentesis in the one case, and the evacuation of the bowels in the other, may bring to light enlargement of the liver, where no positive proof of its existence could previously be obtained.

In determining the existence and extent of enlargements of the liver, considerable assistance may be derived from the practice of percussion, particularly in those cases in which the liver, in enlarging, pushes upwards under the ribs, so as to encroach upon the cavity of the chest. In a case of this kind there will be emitted a dull sound on percussion over the parietes of the chest, throughout the whole of the lower part of the right side, and sometimes (when the left lobe is enlarged) of the left side, also. Nor is auscultation without its use in cases of this description. Mr. Malcolmson has recently pointed out a

loud sound, as heard through the stethoscope, between a crepitous rattle and a bleating, audible to the patient, and even to the bystanders, and accompanied by a vibration of the parietes of the thorax, communicated to the hand applied to the part, which, he is satisfied, is caused by the thin edge of the lung being compressed against the costal pleura by the enlarged liver.

2. In considering the different forms of morbid affections to which the biliary organs are subject, we have had repeated occasion to notice yellowishness of the skin, or *jaundice*, as a symptom, the occurrence of which may be regarded as proving that, either in consequence of intrinsic or extrinsic diseases, of a dynamical or of a structural character, the functions of these organs are not duly exercised. But can we be led any farther by the consideration of this symptom, in determining the nature of the existing disease, than to the simple conclusion of its being seated in the biliary organs, or in their immediate vicinity? Do the characters of the jaundice vary in any respect according to the particular morbid condition on which it depends? For the most precise information which we possess on this subject, we are indebted to Dr. Bright. 1. When jaundice, according to this observant physician, arises from congestion, the countenance gradually assumes a dingy aspect, in which the purple suffusion of carbonized blood is mingled with the yellow tint of a slight jaundice. The conjunctiva is more decidedly tinged; and if the disease continue long, the jaundice sometimes completely prevails over the purple tint. 2. When the jaundice depends upon obstruction of bile in the ducts, particularly the larger ones (as from gall-stones), the skin usually displays a very vivid colour, which comes on suddenly or more gradually, and continues longer or shorter, according to the nature of the obstructing cause. This vivid colour may cease altogether, or may continue until death takes place, or it may pass gradually into a dingy green colour, giving the countenance a mulatto appearance, and which may hence be denominated black jaundice. When the obstruction of the ducts depends upon organic lesion, the countenance generally becomes gradually suffused with bile; at length, the more decided jaundice takes place, and this goes on increasing in intensity for a time, after which the colour loses its brilliancy, assumes a dark green hue, and squalid appearance, which is one of the worst symptoms. 3. In jaundice from structural disease of the liver, the change from the natural colour is usually gradual and inconstant; and the yellow tinge of the conjunctiva often precedes for some weeks any more decided indication. In time, however, preceded by a bronzed appearance of the forehead, or the darkened areola of the eye, a jaundice bearing the lighter tints, from a yellow suffusion to a fainter, or more decided lemon hue, but still liable to considerable fluctuations, establish itself over the whole body. 4. In jaundice from inflammation of the liver, in a day or two after the early symptoms have appeared, the conjunctiva becomes tinged, and, in a few days more, there is universal bright brilliant suffusion of the skin. In the severer cases, a most intense jaundice is diffused over the whole surface. If the disease does not prove fatal at this early period, but goes on for some weeks, the skin assumes a light lemon-coloured tint, bespeaking, says Dr. Bright, a very general disorganization of the liver. In respect to this form of jaundice, Mr. Annesley observes, " A certain degree of jaundice is often remarked in the hepatitis of Europe, especially when it terminates in abscess; but jaundice is not a frequent concomitant of hepatitis in India, unless when the ducts or gall-bladder become involved in the disease, or when it supervenes to biliary calculi, or obstruction of the ducts."

It is obvious, that of the various pathological conditions capable of producing jaundice, some are more or less transient, while others are permanent in their nature. To the former class belong the dynamical affections and the simple circulatory derangements. To the latter, a large proportion, if not the whole, of the structural alterations. In proportion, therefore, to the continuance of an attack of jaundice, is the probability of its depending upon a structural morbid

condition. In some instances, as in spasm of the ducts, or in gall-stones moving backward and forward in their canals, the jaundice may be said to have remittent or intermittent form.

The termination (often sudden) of jaundice in affections of the brain has been frequently noticed. Baglivi mentions a case of sanguineous apoplexy succeeding to jaundice from biliary concretions, and Morgagni has related several instances of jaundice, in which, at an early period of their progress, delirium and convulsions came on and terminated in death. On dissection, no morbid appearances sufficient to account for the jaundice, delirium, convulsions, and death, were discovered. Dr. Powell (*Observ. on the Bile, &c.*) has given the cases of two young females, in whom jaundice, of some continuance, was succeeded by apoplexy and death. On this subject Dr. Marsh states (*Dub. Hosp. Rep.* vol. iii.) that it happens, not unfrequently, that patients labouring under jaundice are seized suddenly with symptoms of cerebral disease, and die phrenetic. This form of disease, he thinks, exists chiefly in persons whose nervous system has, from any cause, been previously injured and weakened. " It may be said," he adds, " that the affection of the brain was an accidental circumstance unconnected with the original disease, and arising from causes quite distinct from the presence or absence of bile in the circulating system." That jaundice is not the only, or even principal, cause is very certain, for we often observe patients to be deeply jaundiced, and yet free from cerebral disorder: but that under certain circumstances, in certain conditions of the nervous system, frenzy may be excited, either by bile conveyed to the brain, or in consequence of the sympathy which exists between the cerebral and hepatic systems, is an assertion, the truth of which Dr. M. conceives the facts stated sufficiently establish. In practice it is important we should be aware, that an icteric patient, who has a weak and irritable nervous system, must be closely looked after, lest alarming symptoms should unexpectedly arise; and in cases of this kind we should be very guarded and cautious in our prognosis.

In explanation of the greater tendency to coma and death in cases of jaundice, Dr. Alison remarks that we have now sufficient evidence to establish two points, 1st, the frequent occurrence of jaundice in cases where the bile-ducts are pervious and appear empty after death; and, 2d, the peculiar (I would not say either the uniform or the exclusive) tendency of such cases of jaundice, thus dependent on suppression of the secretion and retention of the biliary matter in the blood, are also those in which the nervous system is apt to be peculiarly and dangerously affected. Another important inference may be drawn from these facts, viz., that the retention in the blood of matter destined to excretion is much more generally hurtful to the living body, than the reabsorption into the blood of matters which have been secreted at their appropriate organs, but not thrown out of the body, in consequence of obstruction to their outlets. At first view this appears improbable, but it is supported by the analogy of other facts; and if it be true, as stated by Dr. Prout, that nothing is absorbed in the living body without having been previously acted on by the fluids of the body, and undergone a process more or less analogous to digestion, this difference between the noxious qualities of excretions retained and excretions reabsorbed may be easily understood. It is probable that there may be cases where the reabsorbed bile is likewise the cause of fatal coma; and when we reflect how very variously other narcotic poisons affect the nervous system in different individuals, it is not surprising that this difference should be observed. But that the retained bile has this peculiar noxious quality, seems to be clearly shown by the very large proportion of cases of jaundice early fatal in the way of coma, in which the bile-ducts have been found pervious and empty. But whichever of these explanations be regarded as the correct one, whether in the cases in question the brain be the *protopathic*, and the liver the *deuteropathic* organ, or the reverse, the fact which they establish of a frequent connexion between the diseases of these two organs is of the highest importance in practice.

3. In conjunction with jaundice, regarded as a diagnostic symptom, it is necessary to consider the *condition of the alvine evacuations*, both in respect to their freedom and their appearance. As to their freedom, it may be observed, that Heberden, Dr. Powell, and others, agree in stating that there is no foundation for the common opinion, that the absence of bile in the intestinal canal gives rise to costiveness. The appearances exhibited by the alvine evacuations in jaundice are very various. If the non-secretion or non-excretion of the bile be complete, it is obvious that the fæces must be destitute of the colour which they receive from that substance; and that, if it be incomplete, their shade of colour must vary accordingly. If judging from the appearance of the alvine evacuations respecting the cause of jaundice, it may, according to Dr. Bright, be remarked that, 1, in jaundice depending upon *venous congestion*, the dejections, are not obviously deficient in bile; 2, in jaundice from the obstruction of concretions, the stools become of a pale drab colour; and in that from obstruction consequent on organic deposit, they are of the lightest drab colour, approaching to white; 3, in jaundice from chronic change of the liver, the alvine evacuations seldom present that marked deficiency of bile which is observable in some other cases; on the contrary, they vary through the different shades of brown and yellow, and are often remarkable rather for the unequal manner in which the bile is mingled, than for the absence of that secretion; the action of the bowels is generally irregular; and as the disease advances, evacuations of blood frequently take place; 4, in jaundice from hepatitis, the stools are, both in the more and less acute cases, of a light colour: but less decidedly so, and subject to greater variations, than when the obstruction is mechanical; and occasionally, after a few days, they give little evidence of the deficiency of bile. That in a particular case there should exist bilious yellowness of the skin, and yet the dejections exhibit their usual colour, shows that the affection is not of such a nature or of such a degree as to prevent the whole or a part of the bile from passing into the duodenum. This appears to be the case in venous congestion, and to a greater or less degree in the inflammatory and chronic affections of the liver. And even when there is a stone in the hepatic or choledoch duct, if it does not so exactly fill the canal but that some bile passes by, the stools, as well as the skin, may be tinged yellow. (*Bright's Reports.*)

4. It may here be remarked, that the condition of the urine becomes altered in various forms of hepatic disease. In jaundice, this secretion is of a deep yellow colour, which it may assume previously to any discoloration of the skin, and which is even present, sometimes, in diseases of the liver, in which the skin preserves its natural appearance. We may consider this symptom, therefore, as a more delicate test of the existence of bile in the blood, than yellowness of the skin. In some cases of jaundice, the urine becomes loaded with bile, till it assumes a colour deeper than porter, but of a green tint.

5. The occurrence of *pain* in the hepatic region does not in itself constitute a conclusive proof of the existence of disease in the biliary organs; for experience has shown that pain may occur in this situation from affections of various other parts, especially from inflammation of the pleura, particularly its diaphragmatic portion; from partial peritonitis in the vicinity of the liver; from acute or chronic inflammation of the pylorus, or commencement of the duodenum; from nephritis; and from tumours developed either between the kidney and liver, or below the gastro-hepatic epiploon. M. Andral notices that sharp pains are sometimes observed in the hepatic region, which are not accounted for after death by the existence of any lesion in the liver or its excretory ducts; and which for various reasons he regards as neuralgic affections of the pneumogastric or great sympathetic nerves.

The structural disease of the biliary organs most liable to be attended with pain (next to gall-stones, inflammation, and suppuration), seems, according to Andral to be the production of encephaloid matter in the inflamed texture of the liver. Many of the chronic affections of this organ are attended with little or no

pain, as the developement of hydatids, fatty degeneration, induration, hypertrophy, granulations, cirrhosis, &c. The pain in organic diseases of the liver, when it does exist, may be diffused or circumscribed. Thus, as M. Andral observes, in some cases of this kind the whole of the lower part of the right side of the chest, and the right hypochondrium, are the seat of a painful affection : in others it is felt in one or other of the following situations ; 1, towards the epigastric region ; 2, along the cartilaginous border of the right false ribs ; 3, in a more or less limited point of the right hypochondrium, towards the lower and lateral part of the right side ; 5, posteriorly on the same side, near the vertebral column ; 6, in the left hypochondrium, at the space usually occupied either by the great end of the stomach, or by the spleen ; 7, in different points of the abdomen, such as the umbilicus, flanks, &c. The pain may be felt on pressure only, or in particular postures, or it may be constant independently of pressure or position. It varies also in degree of severity as well as in duration.

6. *Cough* has been already mentioned as a not unfrequent symptom of inflammation of the liver. It is also occasionally observed in hepatic enlargement unattended by inflammation, and has been accounted for on the supposition, that the increased weight of the organ by dragging down the diaphragm, stretches and irritates the respiratory nerves ; and it has been supposed, also, that this influence of the enlarged liver over the respiratory organs may be exercised through the medium of the stomach, in cases in which the liver by an increase of size transversely, or from one hypochondrium to the other, produces pressure on that organ.

7. *Dropsy*, chiefly in the form of ascites, attends many diseases of the liver, being occasioned by the obstruction of the circulation through the vena portarum, to which these diseases give rise. Dropsy from this cause may be distinguished from that supervening to other diseases, as those of the heart, from this circumstance, that in cases of the latter description, as the obstruction operates on the vessels of the common circulation, the dropsical effusion commences at the extremities of those vessels, viz., in the feet and ankles, and gradually extends along the legs and thighs to the cavity of the abdomen ; whereas, in diseases of the liver, as the obstruction affects the portal system, the effusion commences within the cavity of the abdomen.

It is those diseases of the liver in which that organ undergoes condensation and induration throughout its whole extent, such as the various forms of granular degeneration, that principally give rise to dropsy. M. Andral particularly insists on dropsy being an almost constant occurrence in atrophy of the liver likewise, of which, indeed, it may be the only discoverable symptom. (See *Bright's Rep.*)

8. Another consequence that may result from impeded circulation through the vena portarum, is *hæmorrhagic effusion*. Heberden observes, that in the advanced state of what he calls inflammatory scirrhi of the liver, " the blood will gush out in great quantities from the nose, the gums, the stomach, the navel, and with the stools, which is probably to be attributed to the obstruction which it meets with in the scirrhous liver." And Mr. Langstaff mentions, that he has noticed, in most organic affections of the liver, that nasal, stomachic, or intestinal hæmorrhage are not unfrequent occurrences ; which he supposes to arise from excessive determination of blood to the mucous surfaces of those parts, and nature relieving their over-distension by hæmorrhagic profluvia. To these observations may be added those made by Dr. Bright, in his *Remarks on Jaundice*. That accurate observer states, that should death occur in jaundice from congestion, it will probably have been preceded by the passage of blood, more or less freely, from the lungs or the intestines ; that in jaundice from organic deposit, at an advanced stage, ecchymosis takes place in various parts, and blood escapes from different surfaces ; and that in jaundice from inflammatory action in the liver, the tendency to hæmorrhage sometimes comes on early, and is excessive.

Treatment. In respect of the treatment of a case of structural affection of the liver, there are obviously two points to be considered by the practitioner : 1st, how far the disease admits of being removed ; and, 2dly, how far its symptoms admit of being alleviated, and its progress retarded.

Except in the case of serous or hydatid cysts, where surgical operation may be had recourse to, the only way in which we can conceive a structural disease of the liver to undergo removal, is by the reabsorption of the morbid deposit. The question for practical consideration is therefore : " When solid matters have been deposited in the liver, interstitially or in masses, so as to produce its various forms of induration and enlargement, what expectations we are warranted in entertaining of their absorption taking place either spontaneously or under the influence of remedies ?"

It is obvious, that whatever uncertainties attend the investigation as to the possibility of the resolution of peculiar structural degenerations occupying external parts, these difficulties will be greatly increased when we come to pursue a similar inquiry with regard to internal organs like the liver. There is sufficient testimony to the fact of enlargements of this organ having been reduced by medical treatment; but whether, in any cases of this kind, the swelling had any other origin than that of chronic inflammation,—whether, for example, any case of cirrhosis of the liver, or of granular or fatty degeneration of that organ, has ever undergone spontaneous recovery, or been removed by medicine,—are matters respecting which our only information is of the nature of conjecture.

The conclusions at which different practitioners have arrived as to the efficacy of iodine in such cases, do not correspond. Dr. Abercrombie mentions, that in several cases of chronic affections of the liver, accompanied by jaundice, he has seen very good effects from the external use of iodine, in an ointment containing half a drachm to an ounce of axunge. A favourable statement of its efficacy has also been given by Dr. Milligan and others. Mr. Twining, on the contrary, has found this medicinal agent remarkably unsuccessful ; and he points out an effect resulting from its administration in other complaints, which renders it necessary to be particularly cautious in employing it in affections of the liver. Of twenty-three Europeans, to whom he had prescribed it internally, for the cure of various diseases not considered hepatic, five became affected with pain in the right side. " The observations of our professional brethren in Europe," observes Mr. T., " afford reason to believe that iodine, administered in large doses, is liable occasionally to excite pain in the region of the liver ; and in some instances, the existence of hepatitis in such cases has been proved by post mortem inspections. Dr. Christison alludes to two instances in which hepatitis occurred in persons who had recently taken large doses of iodine (reported by Rust and Zinc), and thinks it not improbable that iodine possesses the power of inflaming the liver." In corroboration of this opinion, we may quote the following observations :—" A case recently fell under our own observation, in which the employment of iodine for chronic enlargement of the uterus was followed by acute pain in the hepatic region, extending thence to the right shoulder, and requiring the free application of leeches and mercurial purgatives for its removal. On the other hand, chronic enlargement of the liver, to such an extent that the organ extended below the umbilicus, the sequel of remittent fever in a youth of seventeen, was entirely dispersed by frictions with a strong ointment of iodine, and a course of purgatives." (*Brit. and For. Med. Rev.* iii. p. 354.)

The palliative treatment to be pursued in the progress of structural affections of the liver, must have chiefly for its objects, the relief of pain, the removal of dropsical effusion, and the maintenance or improvement of the general health.

When the pain seems to depend either on the specific character of the structural alteration, as in the case of cancer, or on the pressure arising from the increased bulk of the organ, it is perhaps only from narcotics that relief can be attained. Any appearance of the pain depending on the supervention of con-

gestion or inflammation on an existing structural affection, will induce the practitioner to have recourse to the appropriate means for removing these states. The remedies to be employed for the removal of dropsical effusion depending on structural disease of the liver, will be found detailed under DROPSY.

For the maintenance or improvement of the general health, the practitioner must mainly rely on the regulation of the *non-naturals*. With respect to the regulation of the diet, there are obviously two precautions of great importance to be attended to: 1. That, in respect of quantity and quality, it shall be of easy digestion; and, 2. When there is any tendency to febrile action, that it shall be of a strictly antiphlogistic character. With a view to the first of these objects, every thing unsuitable for a weak or dyspeptic stomach ought at once to be discarded: the diet should consist of farinaceous substances during the progress of acute attacks, and this should be observed in a great degree likewise in the more chronic forms of liver disease. With the farinacea may be combined a due proportion of milk, to which, if necessary to make it agree with the stomach, fifteen or twenty drops of the aqua potassæ, or a third part of lime-water may be added. At dinner, a small quantity of soup, or a bit of plain-dressed animal food, may be substituted for the milk. Where the addition of a stimulant seems desirable, a little wine and water, or probably still better, a proportional quantity of spirits and water, may be taken.

It is a matter of primary importance in this class of diseases to keep the bowels open with laxative or purgative medicines. The choice of these remedies must be left to the discretion of the practitioner, guided by the previous habits of the patient, and the visible effects which they produce.

Warm clothing is at all times an object of great consequence in the treatment of chronic diseases of the liver, as, by favouring the course of the circulation to the extremities and surface of the body, it diminishes the risk of the supervention of an acute attack upon a chronic affection, which is always to be apprehended. It is beneficial also with a view to the promotion of digestion; for " the stomach," as Dr. Saunders remarks, " is greatly assisted in its energy and power, by warm clothing, especially on the lower extremities of the body."

When the disease has been brought on by the unhealthy character of the climate or locality, a change to a better residence will of course be conducive, if not essential, to recovery; but this remark applies more particularly to chronic affections depending on congestion or inflammation, than to those in which there exists a positive structural alteration. Where the diagnosis is doubtful, the precaution is not to be neglected.

DISEASES OF THE PANCREAS.

Alterations in the pancreatic secretion.—Congestion and hæmorrhage.—Inflammation and its consequences.—Hypertrophy.—Atrophy.—Induration.—Cartilaginous transformation.—Fatty transformation.—Steatomatous concretions.—Tubercles.—Serous cysts and hydatids.—Scirrho-cancerous degeneration.—Melanosis.—Calculous concretions.—Diagnosis and symptoms of the diseases of the pancreas.—Causes.—Treatment.

THE pancreas resembles the liver in being a secreting gland, which discharges into the same portion of the intestinal canal, and in many instances by the same orifice, a fluid that has an important influence in the process of assimilation. We shall offer a few observations on alterations of the pancreatic secretion before entering on the consideration of its structural diseases.

Alterations in the pancreatic secretion. The secretion of the pancreas may be morbid in respect of quantity or of quality. In respect of quantity, it may

be morbid by excess or by deficiency. In the event of the pancreatic secretion experiencing a considerable increase in quantity, it is obvious, that after its excretion into the intestinal tube, unless it be reabsorbed by the vigorous action of the lacteal vessels, it must be discharged by one or other extremity of the alimentary canal. The resemblance which the alvine evacuations have exhibited, in many cases of diarrhœa, to the salivary and pancreatic fluids, has led many practitioners to entertain the belief that an excessive pancreatic secretion is not an uncommon cause of this affection. An excessive secretion by the pancreas may, from the analogy of other glands, be supposed to occur independently of any structural alteration of that organ; but it is alleged, that in some of its structural alterations, a diarrhœa is liable to supervene, which exhibits more or less the characters of the pancreatic secretion. The cases in which it has been supposed that an excessive pancreatic secretion has been discharged by the mouth, seem liable to greater doubt than the cases last alluded to, from the obvious circumstance that the fluid thus discharged may have actually proceeded from the buccal salivary glands. Where, however, the discharge of a fluid exhibiting those characters which are common to saliva and pancreatic juice, is accompanied with distinct marks of inverted action of the œsophagus, as is said to have been observed in several instances, it may reasonably be concluded that the pancreas has had a share in its production; more especially if there occur, at the same time, symptoms that seem decidedly referrible to that organ.

As dropsical effusions are occasionally removed by increased renal secretion, so it has been supposed, that in those in which the removal of the dropsical affection has seemed to depend on increased watery discharge from the intestinal canal, this discharge has, in its turn, depended on an excessive secretion from the pancreas, either occurring spontaneously, or in consequence of the action of medicinal substances capable of stimulating that organ, as, for example, of tobacco. In some of these instances, the supposed pancreatic secretion has come away in the form of salivation or vomiting; in others, in the form of watery alvine evacuations.

In some experiments in which Brunner extirpated the pancreas, it was found that the alvine evacuations became indurated and scanty; and it has hence been inferred, that these morbid conditions may, in some instances at least, be attributable to a deficient pancreatic secretion.

In cases in which an increased secretion from the pancreas has been supposed to have occurred, this fluid has seemed to exhibit proofs, by its action on the alimentary canal, as well as by its taste, of its having undergone changes in its qualities. It is well known, that in that form of dyspepsia, termed Pyrosis or Gastrorrhœa, there is a fluid ejected from the stomach, which is usually tasteless, though sometimes slightly acid. The production of this fluid has generally been ascribed to an increased and altered secretion of the glands of the mucous membrane of the stomach: but some pathologists are inclined to think that, in some cases at least, this fluid may be the produce of pancreatic secretion. M. Guersent has been led to conclude that the morbid acid secretion in pyrosis is not always formed in the stomach or intestinal canal, but sometimes by the salivary glands; and that this is particularly the case in persons labouring under this disease, whose teeth exhibit proofs of having been destroyed by the action of acids. It has, therefore, been thought not unreasonable to conclude that the pancreas, which so much resembles the salivary glands in structure and functions, may experience similar modifications in respect of the fluid which it secretes.

Whatever foundation there may be for these suppositions as to the pancreatic origin of the profuse watery discharge which occurs in pyrosis, the liability of the pancreatic secretion to experience vitiations,—which might, indeed, be inferred from the analogy of other glandular secretions, and particularly from what has been recently ascertained respecting the morbid conditions of the

saliva,—is plainly shown in the occasional formation of calculous concretions in the pancreatic duct.

It has been supposed, that in some cases of hysterical ischuria, in which a urinous fluid has been discharged by vomiting, the explanation may be found in the pancreas acting vicariously for the kidneys, so as to secrete a fluid similar to urine ; and that the salivary glands of the mouth may participate in the same vicarious action.

Congestion and Hæmorrhage. That the pancreas must be liable to congestion and hæmorrhage, there can be no doubt ; but few opportunities seem to have occurred of witnessing, by examinations after death, the morbid alterations produced by these states in the structure of this organ. A case related by Storek, in which the pancreas was so large and heavy that it exceeded thirteen pounds in weight, affords one of the few, if not, indeed, the only example that has been recorded of pancreatic hæmorrhage. On cutting into this mass, it was found to consist merely of a sac filled with blood, partly grumous, partly coagulated, and beginning, it is stated, to become organized.

Inflammation. The number of cases in which the pancreas is found, on post mortem examination, to be in a state of *acute* inflammation, is certainly not large. From those cases in which an opportunity has occurred of examining the pancreas in this condition, it appears to be characterized by redness of the substance of the organ, and by injection and infiltration of its interlobular cellular tissue, rendering the lobules more distinct and more dense than natural. In the more intense degrees of inflammation, the pancreas is said to acquire a brownish-red colour, and its tissue to become softened, and more easily torn than in its sound condition. Mr. Lawrence says of a pancreas which he had an opportunity of examining, and which he regarded as being in a state of active inflammation, that it was throughout of a deep and dull red colour, which contrasted very remarkably with the bloodless condition of other parts ; it was firm to the feel externally, and when an incision was made into it, the divided lobules felt particularly firm and crisp. The texture was otherwise healthy. (*Med. Chir. Trans.*, vol. xvi.)

When the pancreas has been the seat of *chronic* inflammation, it is said to acquire a great increase in the density of its tissue, which swells, becomes more dry and elastic than natural, and of a reddish and whitish-yellow colour. Occasionally, also, as a consequence of chronic inflammation of this organ, there are found red spots and infiltrations of blood, as if incorporated in the condensed cellular tissue ; but this alteration does not seem to be very constant.

Inflammation of the pancreas may terminate in *resolution ;* or it may give rise to the effusion of *coagulable lymph* upon its outer surface, or of *pus* into its substance. It is said in some instances to terminate in *gangrene.*

In consequence of the effusion and subsequent organization of coagulable lymph upon the surface of the pancreas, it has occasionally been found covered by a false membrane of great consistence. By the extension of the adhesive inflammation to some of the neighbouring organs, as to the stomach, the duodenum, the liver, the spleen, the mesentery, the mesocolon, &c., bands are occasionally formed, connecting the pancreas to one or more of these organs, which sometimes acquire so great a degree of hardness, as to be with difficulty divided with the scalpel.

When an abscess is forming in the substance of the pancreas, the pus, according to Gendrin, is infiltrated into its interlobular tissue. The glandular granules are very soft, of a reddish-gray colour, and sometimes manifestly diminished in size, although the whole organ is usually, though not invariably, enlarged. The investing capsule is itself much inflamed, and sometimes thickened by the formation of false membrane. When the process of suppuration is completed, the pus is generally collected in one cavity. In most cases, the inflammation of the pancreas being but partial, the pus is infiltrated into a cavity of moderate size, and being intermixed with the pancreatic fluid, exhibits

the appearance of purulent matter combined with a clear yellowish fluid, and with a whitish curdy substance, the most dependent part of the cavity being occupied with a gray powdery pus. Suppuration of the pancreas sometimes proceeds to such an extent that its texture is almost entirely destroyed. The character of the purulent matter, in such cases, seems to be various. According to Gendrin, in large purulent deposits, it is commonly inodorous and creamy : Portal, on the other hand, states, that in complete suppuration of the pancreas, the pus is sometimes of an intolerable smell : it has been found of a greenish colour, but usually it is of a grayish-white, like that of other abscesses, unless it be the result of scrofulous suppuration, in which cases the pus is whiter and grumous. In some instances, the substance of the pancreas being completely destroyed, the purulent matter is contained in a membranous envelope, formed by the cellular texture which covers the organ. Portal has seen more than two pounds of pus contained in a sac of this description.

The occurrence of abscesses in the substance of the pancreas, or in the cellular texture around it, has been observed in various diseases of organs or textures more or less remote. Portal speaks of it as having been observed repeatedly in diseases of the testicles ; and mentions one case in particular, in which, after the extirpation of a testicle and the ligature of the spermatic cord, a large quantity of pus was found in the cord, and a considerable abscess surrounding the pancreas ; and he refers to Antoine Petit as adducing different examples of this kind in support of his objections to the practice of ligature. M. Tonnellé mentions two cases of puerperal peritonitis, in which pancreatic abscess occurred.

The contents of a pancreatic abscess may be discharged in various directions. Sometimes they escape into the cavity of the abdomen ; sometimes they pass into the stomach ; and sometimes into the duplicature of the mesocolon, where they may be retained as in a sac, or, having perforated one of its laminæ, may be effused into the cavity of the abdomen. It is supposed also that the pus of a pancreatic abscess may find its way into the intestinal canal, and be discharged by stool, without any obvious communication being established between them. Thus, in a case communicated by Dr. Haygarth to Dr. Percival, in which, on dissection after death, the pancreas was found to contain a considerable abscess, during life, blood, and at length fetid pus, had been discharged by stool.

In respect of the pancreas, as of other internal organs, it is necessary to be very cautious of admitting the occurrence of *gangrene* as a consequence of inflammatory disease ; many different alterations having been described, or referred to, under that name. Portal goes so far as to allege that gangrene of the pancreas is a frequent consequence of its inflammation, and that he has met with it in several instances : in one case, which he particularly specifies, the pancreas was found on examination to be of a violet-red colour, softened, allowing a blackish fetid humour to exude from its external surface ; in short, says he, it was gangrenous almost through its whole extent. Gendrin quotes what he conceives to have been a case of gangrene of the pancreas, occurring after chronic inflammation ; and suggests it as probable, that in this, as in other tissues, acute inflammation passes readily and completely into the state of sphacelus only in cases in which the organ has been previously weakened by chronic disease.

Hypertrophy. The pancreas seems to be liable to the state of hypertrophy, understanding by that term an increased amount of its natural substance ; but from the cellular substance which intersects its glandular structure participating in the affection, the viscus, in undergoing hypertrophy, loses a good deal of its natural appearance, and is converted into a hard white mass, intersected by opaque membranous septa, so as to give it a scirrhoid character ; and hence, by some, this morbid alteration has been considered as the first step towards scirrhous degeneration, and by others as actual scirrhus.

Atrophy. The pancreas may undergo such a degree of atrophy as to reduce

it to the half or to the fourth of its natural size. Atrophy of the pancreas may occur as a consequence of disease of the gland itself; but most usually it is attributable to pressure caused by a morbid alteration of the liver, or of the stomach, or of some other neighbouring organ, as aneurism of the abdominal aorta. It has been suggested, that in cancerous affections of the stomach, with obstruction of the pylorus, the atrophied state of the pancreas, which is frequently observed, may be attributable, in part at least, to the inactivity of this organ, in consequence of its secretion being no longer stimulated by the arrival of the chyme in the duodenum.

Induration. The pancreas is sometimes found of a firmer consistence than usual, without any perceptible alteration of its structure. It has been alleged, that in these cases the glandular granules are the seat of induration, whilst the surrounding cellular texture remains of a healthy character. It is not uncommon, we believe, for induration of this kind to disappear, as happened in Mr. Lawrence's case, at no considerable period after exposure of the parts to the air. The pancreas has been found also, on various occasions, in a state of preternatural softness.

Cartilaginous Transformation. A considerable number of cases has been recorded, in which the pancreas has been found *cartilaginous.* In nearly all these instances, one or several of the surrounding organs had undergone the same transformation ; but in some rare examples, the pancreas has been the exclusive seat of cartilaginous degeneration.

Fatty Transformation. It would appear, from some cases that have been recorded, that the pancreas may undergo, in whole or in part, transformation into a fatty tissue ; but, as Cruveilhier has remarked, this state, which is very rare, must not be confounded with the accumulation of fat in the laminous texture, which unites together the lobes and lobules of the pancreas.

Steatomatous Concretions. Portal states, that the pancreas is sometimes found full of concretions truly steatomatous, hard or softened, white like suet, or yellowish like honey : sometimes the pancreas is enlarged by this matter throughout its whole substance, and sometimes only in particular parts. Those who have died of scrofula, and in whom the glands of the neck, axillæ, groins, or mesentery, were obstructed, had likewise the pancreas equally affected. He mentions a particular case, in which the mesenteric glands were full of steatomatous concretions, and in which the pancreas, besides being enormously enlarged and full of similar concretions, was covered by one of the consistence of suet, and more than five or six lines in thickness. In this case, the surrounding cellular texture, the mesocolon, and the parietes of the stomach, were cartilaginous and thickened, in consequence, he supposes, of the pressure of the tumour. Portal states, however, that the pancreas has been found affected, when no marks of scrofula were observable in any other part of the body.

The steatomatous concretion of Portal seems to be identical with the *tubercle* of the present day ; and accordingly, both in the human subject and in the lower animals, tubercles of the pancreas have been occasionally met with, particularly in cases in which the lungs had undergone a similar degeneration. M. Lombard states, that of one hundred cases of tuberculous disease in children which he examined, he found, in five, tubercles existing in the pancreas.

Serous Cysts and Hydatids. With regard to serous cysts and hydatids, it does not appear that they are of frequent occurrence in this gland.

Scirrho-cancerous Degeneration. From the recorded cases of morbid alterations of the pancreas, it would appear that scirrho-cancerous degeneration is the one most frequently met with. In a large proportion of cases of this affection, other organs, no doubt, have been found simultaneously diseased ; but in some of these, at least, the pancreas has probably been the primary seat of cancerous disease, and in other instances, the affection has been entirely confined to that organ. Dr. Bigsby enumerates twenty-eight cases of carcinoma of the pancreas, recorded by different authors, which he conceives to have been idiopathic ; and

in eight of these, which were of long standing, the carcinomatous disease did not extend beyond the pancreas.   There is every reason, Dr. Bigsby conceives, to believe that carcinoma of the pancreas commences in simple induration ; for such a condition, either simple, or combined with carcinoma, in some one or several of its forms, is not unfrequently met with.   In its carcinomatous degene- ration, the pancreas usually undergoes enlargement ; and on some rare occasions, even to such an extent as to equal the liver in its dimensions.   Dr. Bigsby has met with only two cases, on record, of carcinomatous degeneration of the pan- creas, in which it is distinctly stated that the gland had not increased in size. The carcinoma may occupy the whole of the pancreas, but it is in general con- fined to a part ; it is often diffused irregularly and with undefined boundaries through the organ, which is, in its other parts, merely indurated.   In the cases that have been published, its peculiar texture is usually termed, concisely, *scirrhus*. Where it is characterized with greater minuteness, it is said to be, in the first or hard stage, gristly, dense, and heavy, like cow's udder.

Of the twenty-eight cases analyzed by Dr. Bigsby, in seventeen the disease had not arrived at the stage of softening, although some of them had existed for years ; it was purely scirrhus.   In five cases, he states, the scirrhus had at the time of death passed into the soft state called cephaloma by Dr. Carswell, and medullary sarcoma by previous writers : some parts, however, were as hard as cartilage ; but the others had all the pulpy, pale yellow, brain-like character of the second stage of scirrhus.   In one instance, death took place from sudden hæmorrhage, and a large and deep ulcerated cavity was found in the cephalo- matous head of the pancreas, communicating by a wide opening with the duo- denum.   In another, the pancreas was changed into a sac, with a few shreds of cephaloma here and there on its sides, and much brownish matter, like coa- gulated blood.   And, lastly, in two cases no vestige of any form of scirrhus remained, the gland being altogether in a state of cancerous ulceration.

Melanosis may occur in the pancreas, as in all the other organs of the body.

Calculi. Calculous concretions are occasionally found in the pancreatic duct and its branches, which resemble those of the salivary glands.   Some authors, as Mondière, speak of concretions occurring in the substance of the pancreas ; but it seems probable that, as in the case of the calculi of the tubuli biliferi, the concretions referred to were actually seated in the minute ramifica- tions of the pancreatic duct.   Pancreatic calculi are usually white, but occa- sionally black ; they vary much in shape, being sometimes round, and some- times irregular ; their size ranges from that of a pea to that of a hazel-nut, and their number from seven or eight to twenty.   Gendrin mentions, that the pan- creatic duct is sometimes clogged, not with distinct concretions, but with a chalky powder.   In respect of chemical composition, it seems probable that pancreatic calculi are liable to some variations.   Dr. Pemberton states that a calculus from the human pancreas, with which he had been favoured by Dr. Baillie, consisted entirely of carbonate of lime ; but that Dr. Wollaston, in ana- lyzing a calculus from the pancreas of an ox, proved it to consist of phosphate of lime.   Portal mentions, that in a case in which he met with a dozen of light, round, whitish calculi in the pancreas, he found that when he reduced one or two into coarse powder, and threw this into boiling water, it readily dissolved ; and Fourcroy states, as the results of his examinations, that pancreatic concre- tions are composed of phosphate of lime, combined with some animal matter, just as is the case with salivary calculi.

Diagnosis and Symptoms. In respect of the pancreas, as of every other organ, *diagnosis* has a twofold object ; first, to ascertain the symptoms by which the practitioner may be led, in particular cases, to infer that the disease is actually seated in that organ ; and, secondly, to determine by what symptoms its several diseases may be distinguished from one another.   It must be admit- ted, that in both of these respects, diagnosis, as respects the disease of the pan- creas, is but little advanced.   The functions which the fluid secreted by this

organ performs, are perhaps not very well understood; and at all events, their execution is far removed from observation. The position of the organ, likewise, is such, that variations in its physical conditions are not easily detected till they attain a very considerable degree. In fact, most of the *symptoms* which present themselves in cases of pancreatic disease, arise, not primarily from alterations in its own conditions, but secondarily from the disturbances which they occasion in the surrounding parts. These, it is obvious, must vary according to the organs which happens to be principally affected; and, in particular, according to the organ which, in cases of enlargement of the pancreas, happens to sustain the greatest degree of compression. This may be the pylorus, or the lower portion of the duodenum; or the choledoch duct; or the vena portæ and its branches; and sometimes it is the aorta upon which the compression of the enlarged pancreas most immediately acts, and in which the most striking symptoms of pancreatic affections have their more immediate origin. The community between the diseases of the pancreas and those of neighbouring organs, in respect of several symptoms, has led some practitioners to conceive that it is on the symptoms which are absent, rather than on those which are present, that the diagnosis of pancreatic disease must mainly be founded; but, as Dr. Bright has shrewdly shown, to diagnosticate, on this principle, the diseases of the pancreas, would require a more accurate knowledge of the symptoms of the various diseases of the different organs by which it is surrounded, than we can as yet pretend to possess.

With respect to acute inflammation of the pancreas, the following are the symptoms which have been most frequently observed in cases of this nature; viz. dyspepsia; anxiety towards the epigastric region, with heat, and fixed, obtuse, and deep pain, extending towards the right hypochondrium and to the chest; thirst; sense of heat in the throat; acid eructations, pyrosis, gastrodynia, fits of nausea, and sometimes vomiting of ropy and saltish fluids; most generally constipation, sometimes diarrhœa, particularly in the cases in which the inflammation of the pancreas succeeds to salivation; in other instances, salivation, instead of preceding the disease, is a sympathetic effect of it. Frequently, in such cases, there is said to be a swelling of the parotid glands. The alvine evacuations are frequently watery, and bear more or less resemblance to saliva. When the inflammation is very intense, acute pains are experienced at the epigastrium : most frequently, in this case, there is tumefaction of the pancreas; and there may sometimes be felt a circumscribed tumour, nearly circular, sensible to pressure, and which may, to a certain extent, be distinguished from that produced by scirrhus of the same organ, inasmuch as it is found to yield under continued pressure. Lying on the back is painful, and often impossible : the pain is increased by coughing, by inspiration, by a full state of the stomach, and by lying on the left side. The tongue is whitish, and does not exhibit the appearance of redness that is observed in gastritis. There is seldom any great degree of fever.

The symptoms which are most usually met with in different organic alterations of the pancreas, and which singly, or variously combined, furnish the positive materials of which the practitioner has to avail himself in endeavouring to detect the presence and determine the nature of these affections, are,—pain, constipation, diarrhœa, salivation, vomiting, jaundice, tumour, and emaciation. Dr. Pemberton states, that in all the cases of diseased pancreas, as ascertained by examination after death, which had fallen under his notice, there had always occurred, during life, more or less deep-seated pain in the region of the stomach, with sickness and emaciation; so that he was inclined to believe that, in diseased pancreas, these symptoms are never wanting; and such, indeed, he remarks, is the opinion which medical men have commonly entertained. Dr. Abercrombie mentions, that of twenty-seven cases of chronic disease of the pancreas, which he finds described by various writers, six were fatal, with gradual

wasting and obscure dyspeptic complaints, without any urgent symptom ; in eight, there was frequent vomiting, with more or less pain in the epigastric region : and thirteen were fatal with long continued pain, without vomiting. Dr. Abercrombie also remarks, that it does not appear from this analysis, that any distinct relation can be traced betwixt the urgency of the symptoms and the degree of enlargement, for enlargement existed in a great degree, in some of the cases, in which the symptoms were slight and obscure ; and there was hardness, with little or no enlargement, in others, in which the symptoms were defined and violent.

Causes. With respect to the causes on which diseases of the pancreas may depend, these may be either agents acting primarily on this organ, or diseases of other organs extending to it, or, as is supposed sometimes to happen, transferred to it by metastasis. From the analogy, in respect to structure, of the pancreas and salivary glands, it has been thought probable that those substances which excite the latter class of glands to excessive action, such as mercury and tobacco, may exert a similar influence over the pancreas ; and accordingly it has been alleged that the use of these substances is not unfrequently productive of irritation and consequent inflammation of this organ. Alcoholic liquors taken in immoderate quantity, and purgatives frequently repeated, have also been mentioned as frequent causes of inflammation and other diseases of the pancreas ; but it may be doubted whether, in such cases, the pancreatic disease was primary, or whether it commenced in the stomach or duodenum, and afterwards extended to this gland. The long continued administration of bark in intermittent fevers has been mentioned by some authors as a cause of disease of the pancreas ; but it may be doubted whether this is not rather the consequence of the prolongation of the fever, than of the medicine employed for its removal. Several cases have been observed, which seem to favour the idea that inflammatory affections of the parotids may, by metastasis, be transferred to the pancreas.

Treatment. The plan of treatment to be pursued in cases of disease suspected to have its seat in the pancreas, presents little that can be considered as peculiar. In an acute attack of inflammation of this organ, recourse must be had to antiphlogistic measures, comprehending general bloodletting, when the patient affected is strong and plethoric, local bleeding by leeches, or cupping, rest, strict diet, emollient cataplasms, &c. After the inflammation has been diminished by these measures, blisters may be applied to the epigastric region. It has been suggested, that in cases in which symptoms of irritation of the pancreas have succeeded to sudden disappearance of inflammation of the parotid gland, a blister should be applied to the organ that had been primarily affected.

In the treatment of the chronic inflammations and organic alterations of the pancreas, we are in a great measure reduced to palliative means. We must endeavour therefore to combat, by the appropriate remedies, the symptoms which are most urgent. The treatment of scirrhous affection of the pancreas, observes Dr. Sewell, can, it is evident, be only palliative. The principal indications are to alleviate the pain, to restrain the vomiting, and to correct the acidity of the stomach. Mondière thinks that it is particularly on external revulsives that reliance must be placed in the chronic pancreatic diseases. The application of blisters to the epigastrium very generally produces relief. He is himself disposed to think that the moxa, as exerting a more energetic action than blisters, ought to be preferred. The use of opium may be required to diminish the intensity of the pains by which the diseases of this organ are occasionally accompanied. Mercurial frictions, if not the internal use of mercury, have been recommended, as means of cure for enlargements of the pancreas ; but if there be grounds for the suspicion that mercury is liable to excite disease in this organ, it is obvious that its employment as a remedy, in cases in which such disease already exists, must be conducted with great circumspection.

We have never seen a case in which disease of the pancreas was diagnosticated on rational grounds ; this result is derived from a very large number of pathological examinations. We do not, of course, allude to our own experience only, but to that of many others. We cannot, therefore, avoid regarding the diseases of the pancreas as matter of little else than simple anatomical curiosity. The lesions of this organ as found after death are quite rare, with the exception of chronic hardening, which appears to result from previous inflammation.   G.

DISEASES OF THE SPLEEN.

Congestion and inflammation.—Purulent formations.—Gangrene.—Hypertrophy.—Atrophy. Induration.—Softening.—Rupture.—Tubercle.—Serous cysts and hydatids.—Symptoms.—Causes.—Treatment.

Our ignorance of the function, or functions, which the spleen is destined to perform in the animal economy, supersedes any attempt to apply to its diseases the distinction into those that are functional and those that are structural. We may therefore turn our attention at once to the structural affections of this organ, including those in which there is simply a disturbance of its circulation, and those in which its nutritive secretion is morbid in respect to the quantity or the quality of its products.

Congestion and Inflammation. That the spleen is liable to be the seat both of congestion and of inflammation, is well established. But what appearances inflammation of the spleen presents in its early stages, before it has advanced to its more characteristic terminations, such as the effusion of lymph or of pus, so as to enable us to distinguish it from simple congestion, we have not the means of determining. Even of those cases in which indubitable marks of inflammatory action in the spleen are met with on examination after death, many run their course without exhibiting any symptom distinctively indicative of the existence of inflammation ; so that it is only on dissection that the actual nature of the disease is ascertained. And, of course, in cases in which the morbid appearances are not of so marked a character, where in consequence of the peculiar appearance and colour of the organ, it may be impossible to determine, from mere inspection, whether these appearances be referrible to congestion or to the early stages of inflammation, we cannot expect the symptoms that had occurred during life to have been more distinct and characteristic than in cases in which the inflammatory action is proved by its effects to have been more decided.

The difficulty of distinguishing, both by the symptoms that occur during life, and by the appearances found after death, between congestion and inflammation of the spleen, is probably increased by the liability of the former of these states to pass into the latter. That congestion of the spleen frequently repeated, or proceeding to a great degree, should be liable to induce inflammation of the organ, seems, indeed, a very probable supposition, and is maintained by Dr. Bree. (*Med. Chir. Trans.*, vols. ii. and iii.) The difficulty of recognizing the characters of inflammation of the spleen, in examinations after death, is increased by the fact that it occurs most frequently in a chronic form ; active inflammation of the substance of the spleen being rarely observed.

Hypertrophy. There is no organ of the body so liable as the spleen to undergo variations, in respect of size and consistence, singly or conjointly and in every possible degree ; that is to say, the spleen may be of its natural consistence, or harder or softer than natural, while it retains its natural dimensions, or while it undergoes a great increase or a great reduction of its bulk. Very

generally, however, increased or diminished consistence is accompanied with enlargement of the spleen.

Three principal forms of enlargement of the spleen have been observed:— 1, that in which there seems to be no alteration in respect of consistence; 2, that in which the texture is, in a greater or less degree, softer than natural; and, 3, that which is attended with more or less of induration. What the morbid processes are by which each of these forms of enlargement is effected, and, in particular, what share congestion, hypertrophy, and inflammation, respectively, have in their production, is a point about which pathologists are not agreed, and which seems, indeed, by no means easy to determine.

Viewing the subject on the ground of analogy with other organs, we might be disposed to believe, that when the spleen is enlarged without being softer or harder than natural, this must depend on hypertrophy; that when, in undergoing enlargement, it becomes softer than natural, this may depend on congestion or on the early stages of inflammation; and that when it is indurated as well as enlarged, this effect may depend either on simple hypertrophy, or on the more advanced stages of inflammation, in which there occurs an effusion of coagulable lymph. M. Andral takes an entirely different view of this subject. In conformity with certain opinions entertained by him respecting the important part which the contents of the cells of the spleen perform in the morbid alterations of this organ, he regards the changes in its consistence to depend on changes in the blood; conceiving that softening depends on the blood having lost its accustomed consistence, and induration on the blood having acquired a remarkable density.

Softening. Enlargement of the spleen, accompanied with softening, is a morbid condition which has been very frequently observed and described, particularly in connexion with intermittent fevers, of which it is a very common attendant. In its most advanced degree, it presents, on external examination, the character of a large clot of blood inclosed in a thin membrane. If we attempt to lift the spleen when in this extreme degree of softening, the slightest touch is sufficient to tear it, and the organ breaks down in the hands; its proper texture having entirely disappeared and been replaced by black blood, a putrid gore, or a mud-like, inorganic pulp, sometimes colourless, and sometimes of a chestnut-brown colour.

A spleen which has undergone this change, though generally, is not invariably, enlarged. According to Cruveilhier, the spleen never acquires so great a size in this degeneration as in induration, being seldom found to exceed thrice its natural bulk. Softened spleens, however, have been met with, which weighed from seven to eight pounds.

The extreme state of disorganization which we have noticed, does not take place by an immediate transition from the healthy state of the organ. According to Bailly, who has very fully described this alteration, and some of its consequences, as observed by him in the intermittent fever of Rome, the first degree of alteration consists in the spleen assuming a deeper colour than is natural to it; in a short time, a caseous-like matter can be expressed from its texture; in the next stage, this texture admits of being easily torn, the cellular tissue is destroyed, and the parenchyma is now nothing but a fluid, in which we still feel some filaments; at a later period, these filaments disappear, and the spleen is reduced to the state of a membranous sac filled with a grayish-black fluid, which, in some cases, is so abundant as to render it hard and resistant. Whether this state of the spleen is to be regarded as the effect of mere congestion, or of inflammation, is still disputed by pathologists.

Rupture. After the spleen has attained to an extreme degree of softening, it sometimes happens that its investing membrane, being apparently overstretched by its fluid contents, ruptures, and the contents escape into the cavity of the abdomen.

Rupture of the spleen occurring as a consequence of external injury, whether

in the way of pressure or of a blow, has not unfrequently been observed. It is probable, that, in a large proportion of such cases, the organ has, previously to the injury, experienced a greater or less degree of the disorganizing softening which we have described; the more so, that the injury which produced the effect has, in many instances, been slight. Even spontaneous rupture is alleged by Morgagni to have occurred in a case of this kind.

Induration. When the spleen assumes the state of induration, this is some-times accompanied with enlargement, sometimes not. The general characters which indurated spleen presents, have led to its being compared, in some instances, to muscular flesh, and in others to the substance of the liver, or to that state of the lungs in which they have undergone the degeneration usually termed hepatisation. When the spleen has undergone condensation, it varies much in respect of its friability. But this fragility, as Cruveilhier remarks, at length disappears, and is succeeded by a cohesion, or compactness, such as is not seen in any other texture, except as the effect of fibrous transformation. If it be difficult to distinguish the morbid appearances exhibited by inflammation of the spleen in its early stage, from those of congestion, so, as has already been hinted, it is a matter of considerable difficulty, when the solid substance of the spleen is obviously increased in amount, to say whether this depends upon a simple process of hypertrophy, or excessive nutrition, or on an inflammatory process terminating in the effusion of coagulable lymph, or on these two pro-cesses conjoined.

Purulent Formations. The spleen is sometimes found to be the seat of one or more collections of purulent matter. In many instances, certainly, the formation of these is attributable to suppurative inflammation of this organ; but purulent deposits occasionally take place in the spleen, as well as in the liver, in cases of injury of remote parts; and, as some have been disposed to believe, without inflammation occurring in the organ itself, but simply in consequence of the transportation to it of pus that had been formed at or near the seat of the primary injury. The proportion of cases in which inflammation of the spleen terminates in abscess, has been very variously estimated. Great variety occurs in the extent of the portion of spleen which an abscess, when single, occupies, in the number of abscesses that form, in the dimensions to which they respectively attain, and in the part of the organ in which they are situated. Abscesses of the spleen, not bounded by any distinct cyst, sometimes acquire a very great size; and, indeed, the whole viscus has been found converted, as it is said, into pus; its coverings serving merely to hold the contained fluid. An abscess of the spleen may, like that of the liver, in cases in which it does not contract adhesions, discharge its contents into the cavity of the abdomen. But during the continuance of inflammatory action of the spleen, extensive adhesions some-times take place between this organ and the parietes of the abdomen, the diaphragm, the stomach, the liver, and even the colon, and the kidney; and in such cases, when pus has been formed, it may effect different modes of escape, into the neighbouring organs or cavities, or to the exterior of the body. Abscesses of the spleen, like those of the liver, have sometimes a double outlet.

Gangrene. Though gangrene of the spleen was frequently mentioned by the older pathological anatomists, there can be little doubt that in this, as in many other instances, they employed the term to designate a dark and softened condition of the organ; for true gangrene, if it ever occur in the spleen, must certainly be exceedingly rare, though abscesses of the spleen, like those of the liver, sometimes assume a sloughing character.

Tubercle. When the lungs are the seat of tubercular degeneration, the same morbid alteration is not unfrequently formed in the spleen, particularly in young subjects. It does not seem very easy, however, to distinguish between the developement of tubercles in this organ, and the degeneration to which certain round, whitish corpuscles are liable, that are regarded by many anatomists as forming one of the constituent elements of the spleen in the state of health, and

which, by several, if not all, of these authorities, are considered and designated as glandules. According to Heusinger, these bodies are liable to undergo the following changes of structure : 1. The obviously membranous glandules may, he says, be filled with an albuminous substance of variable consistence, sometimes very fluid, but sometimes of a considerable degree of hardness, like albumen hardened in spirit of wine ; 2, they may be filled with pus, or with a caseous-like substance ; 3, they have been seen cartilaginous ; and, 4, they have been found ossified.*

Serous Cysts and Hydatids. The spleen is liable to undergo the various forms of cystic degeneration ; but it would appear that, in few instances only, do the hydatids found in connexion with the spleen originate in its substance ; most of them developing themselves in the gastro-splenic epiploon, or in cysts formed by the peritoneal coat of the spleen, and only involving this organ in their progressive enlargement. Like hydatids of the liver, those of the spleen may be discharged, in consequence of the rupture of their containing cysts, in various directions.

Atrophy. The spleen sometimes experiences a remarkable degree of atrophic diminution, so as to be reduced to the size of a walnut, or even less. The consistence of this organ in a state of atrophy may be increased or diminished, or it may remain unaltered.

Symptoms of diseases of the Spleen. Considering the obscurity of the functions of the spleen, its position, and the frequency with which enlargement constitutes an element in its morbid conditions, it is not surprising that external tumour should be one of the symptoms on which most reliance is placed in recognising the diseases of this organ.

Tumour depending on enlargement of the spleen may occupy, 1, the left hypochondrium ; 2, the flank of that side ; 3, the epigastrium ; 4, the umbilicus ; and, 5, it may pass beyond that point, extend toward the right flank, and occupy the iliac fossæ of the hypogastrium. The enlarged spleen produces a smooth, oblong, solid tumour, felt immediately beneath the integuments, very generally movable, feeling rounded at its posterior part, and presenting an edge more or less sharp in front, where it is often notched, and divided by fissures. But a considerable degree of enlargement may exist, without its forming any projection beneath the cartilaginous border of the ribs ; in which case its existence can be ascertained during life, only by the dull sound emitted on percussion of the chest at its lower lateral portion. Even when tumour exists in the region of the spleen, it may be a matter of some difficulty to determine whether it actually proceeds from that organ, and if so, whether it depends upon the spleen itself being in a state of disease ; for sometimes the spleen forms a tumour, without being enlarged, in consequence of an effusion into the pleura pushing down the diaphragm into the hypochondrium, and dislodging the spleen from its usual situation.

The tumours connected with other organs, that are liable to be mistaken for enlargement of the spleen, seem to be the following .—1. Scirrhous thickening of the stomach ; 2. Diseases of the omentum ; 3. Tumours of the liver, particularly an unusual and separate enlargement of its left lobe ; 4. Tumours formed in the peritoneum ; 5. Tumours seated in the left kidney, or an increase of its size, so that its upper extremity comes to lie behind the ribs ; 6. Ovarian dropsy ; 7. Accumulation of fæces in the colon ; 8. Chronic abscess of the integuments ; and, 9. It is alleged, that organic affections of the heart, or an enlarged, and particularly a hepatized, state of the lungs, often push the ribs so much upwards, as to countenance the suspicion of the existence of enlargement of the spleen.

From the proximity to the spleen of so many other parts, as the heart, the lungs, diaphragm, stomach, kidneys, colon, it is very difficult to determine the

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* Tubercles in the spleen are extremely frequent, especially in children. They are generally small, equal in size, and, as it were, formed at the same time throughout the spleen, and usually occur simultaneously with tubercles in other organs and in the serous tissues.   G.

precise seat of painful sensations experienced in that region.   The degree of the pain, when it can be localized in the spleen, will assist the practitioner in judging of the more or less inflammatory character of the affection.

Pulsation in the region of the spleen seems to occur in affections of that organ, both of an acute and of a chronic nature.

Besides the symptoms of tumour and pain in the region of the spleen, its diseases usually give rise to some of the following phenomena, viz., pain and oppression of respiration, sometimes in the form of dyspnœa, and sometimes of asthma ; cough, generally dry, but sometimes accompanied with mucous expectoration, occasionally there occurs hiccup in place of cough ; various appearances of the blood when drawn from the veins, and the occurrence of several of the symptoms characteristic of scurvy ; various peculiarities of gait, such as bending the body to the left side, resting the hands on the region of the spleen, and in walking, stepping out farther with the right than with the left foot ; distress in, or inability of, lying on the right side ; depression of spirits, torpor of mind, inactivity of body, with much muscular debility ; deadly paleness, or a yellowish hue, tending more to black or green, than in diseases of the liver.   Great liability to hæmorrhage from the various regions of the body, to dropsy, to dysentery, and to ulcers of the legs, may be added to the catalogue of morbid phenomena by which diseases of the spleen are attended in their progress, and which influence very materially their ultimate result.

Causes.   Certain articles of diet and medicine have been supposed to exert an injurious operation upon the spleen, particularly impure water, spirituous liquors, and, according to some, the employment of bark ; but this last supposition does not seem to rest on any very satisfactory evidence.   In a large proportion of the cases of inflammatory enlargement of the spleen, which have been recorded, the disease has been the consequence of external injuries, as of blows or falls on the splenic region.   It seems probable that splenic inflammatory affections will be most liable to follow external injury, in those districts of country in which there is a tendency to the spontaneous developement of this form of disease.

The production of diseases of the spleen, as of those of the liver, seems, in a considerable number of instances, to be consequent on disease already existing in some other portion of the economy.   Their liability to occur in intermittent fevers is well known ; but in recent times, pathologists have been much divided as to the relation which subsists between such forms of fever, and the enlarged state of the spleen with which they are so frequently accompanied ; a doubt having been raised, whether the splenic enlargement occurs as a consequence of morbid actions taking place during the progress of the fever, or whether the fever occurs as the consequence of a previous change in the condition of the spleen,—whether, in short, this state of the spleen be the essential disease, of which the phenomena of intermittent fever are merely symptomatic, as gastro-enteritis has been supposed by some pathologists to be the essential disease of continued fever.   But it is not in fevers which assume an intermittent type only, that the spleen is liable to undergo alterations in its structure.   Recent authors on the continued fever, both of France and of this country, have noticed the frequency of morbid appearances in this organ in fatal cases of that disease.

Authors on diseases of the heart, and on those of the spleen, concur in stating that affections of those two organs very often coexist ; but a discrepancy of opinion subsists, as to which of them should be regarded as the primary disease ; whether morbid conditions of the heart induce or favour the production of morbid conditions of the spleen, or the reverse ; or whether these two organs may act on each other reciprocally, in this respect.

It has been alleged, that diseases of the lungs also are liable to occur in complication with those of the spleen ; but it is unquestionably with the morbid affections of the other abdominal viscera, particularly of the stomach and liver, that the diseases of this organ are most usually combined.

Enlargement of the spleen seems not unfrequently to attend derangement of the menstrual function, or its first appearance, particularly when this is tardy, or its disappearance in the critical period of life.

It is said that there occasionally occurs a metastasis or translation to the spleen, of inflammation seated in some other organ, particularly in gout? and the suppression of natural and of morbid secretions, hæmorrhoids, cutaneous eruptions, ulcers of the feet, &c., have all been regarded as very frequent causes of diseases of the spleen.

Affections of the spleen, and particularly the various forms of its enlargement, are, as has been known from the most ancient times, of much more frequent occurrence in the damp marshy districts both of temperate and hot climates, than in other situations; a great number of the inhabitants of the worst of these districts labouring under these affections. In a large proportion of such cases, the developement of the splenic disease has been contemporaneous with an attack of intermittent fever; but occasionally it would appear that it occurs as an idiopathic disease, in consequence of the combined operation of various morbific causes.

Treatment. In the remarks which we have to offer on the treatment of diseases of the spleen, it will be sufficient to distinguish them into the acute and the chronic; the latter admitting of a further subdivision into those which admit of cure, and those in which we can only hope to palliate symptoms.

With regard to the acute affections of the spleen, there seems to be nothing in their nature to withdraw them from the ordinary principles of the antiphlogistic treatment as applied to similar affections occurring in other organs. General and local detraction of blood are to be had recourse to in an attack of acute splenitis, whatever may have been its cause, just as they would be in acute inflammation of any other organ. Indeed, their use seems to be the more necessary, in this disease, from the very large proportion of blood which the spleen receives even in its healthy state.

How far the simple enlargements of the spleen admit of being reduced by general or by local bloodletting, is a point on which practitioners seem not well agreed. The use of leeches, however, for that purpose, has been strongly recommended by some, and that of cupping by others.

The benefit to be derived from the employment of purgatives, in chronic enlargements of the spleen, is another point on which medical men have expressed contradictory opinions. To say nothing of their having been approved of by the older physicians, from Hippocrates downwards, we find, in recent times, Dr. Bree esteeming continued daily purgation as an effectual means of cure in this class of affections. Compositions of aloes and antimony were preferred by him, but not exclusively adopted. Large doses of neutral salts appeared exceptionable, when exhibited daily, from their occasioning flatulence and depression. But aloes, extract of colocynth, and scammony, with jalap, acted without this inconvenience; and calomel, combined with these at intervals, seemed to produce more effectual discharges from the bowels: tartarized antimony, in such minute doses as not to induce vomiting, always appeared to increase the beneficial effect of these combinations. It appears, as Dr. Abercrombie has remarked, that in the chronic state of enlargement of the spleen, the chief reliance of those who have seen most of the disease, is upon free and continued purging, and especially upon purgatives combined with tonics. The spleen powder and spleen mixture of Bengal, are combinations of rhubarb, jalap, scammony, and cream of tartar, with columba powder and sulphate of iron, taken three times a day, in such doses as to keep up regular but moderate purging. About twenty days are stated by Mr. Twining as the period which is generally required for reducing, by this treatment, a very considerable tumefaction of the spleen, if the case be of recent origin. Others employ nitric acid, with regular aloetic purges. Mr. Henderson speaks very favourably of the combination of acids with purgatives in the treatment of splenic disease, as occurring in

India. He alludes to a preparation of aloes and vinegar, generally in the proportion of an ounce of vinegar to twelve grains of aloes, given so as to affect the bowels considerably, as a much-employed and beneficial remedy, but adds that he has himself derived great benefit from the substitution of nitric acid in place of the vinegar. Piorry and Nivet disapprove much of purging in cases of hypertrophy of the spleen; and the latter goes so far as to say, that modern authors have almost completely renounced this practice; a statement which is amply refuted by the authors to which we have just referred.

The use of mercury was at one time as generally recommended in diseases of the spleen as those of the liver; but its prejudicial action, in cases of this kind, seems to be now almost universally admitted. This fact was noticed by Dr. Vetch in 1824; but it is to the late Mr. Twining that medicine is indebted for the fullest exposition of the injurious operation of mercury in diseases of the spleen.

The remedy which is chiefly extolled by recent French writers, in cases of enlargement of the spleen depending on, or connected with intermittent fever, is bark in different forms. The observations of M. Caron d'Annecy are said to have demonstrated the almost constant efficacy of powdered bark, in the dose of from two to four drachms, and sometimes continued for two or three months, in the cure of enlargement of the spleen depending on this cause. MM. Bally and Piorry also speak in the highest terms of the efficacy of the sulphate of quinine, in reducing enlargement of the spleen.

Some cases of enlarged spleen have been recorded, in which the action of iodine has appeared to produce very beneficial results. Dr. Bigsby says, that the tuberculated condition of the spleen, which is met with in children, is certainly much under the control of minute and long-continued doses of iodine. But in what manner certainty on this point was attained, he has not explained. He adds, that the iodine should be applied at the same time to the side, in the form of a liniment.

The employment of the actual cautery, in the treatment of enlarged spleen, was very strongly recommended to the notice of the medical profession, by a letter from Mr. Young of Bengal, published in the *Annals of Medicine* for 1801, in which he gives an account of a cure performed, by means of this remedy, upon himself. He states, that the actual cautery is, among the natives of Bengal, so universal a remedy for the enlargement of the spleen, which succeeds to the bilious remitting fever, that few of them are not marked by it. Mr. Henderson speaks of its being common for the natives of Hindostan to resort, in the treatment of splenitis, to ulcers, issues, and cupping; but he considers these remedies as by no means worthy of being relied on.

Percussion, as a remedy in enlargement of the spleen, seems to have been long practised in different parts of the world. It is mentioned with disapprobation by Fabricius ab Aquapendente; but Grottanelli speaks of it as being pursued with success in Italy, at the present day. Dr. Chisholm has mentioned the case of a gentleman in Grenada, whose spleen had undergone great enlargement in consequence of repeated attacks of remittent fever, but who derived much benefit from pressure, or kneading. As a means of relief applicable to all the species of enlarged spleen, M. Nivet very properly mentions compression of the abdomen, effected by means of a large body bandage, supported with straps passing below the thighs and buttocks. It presents the advantage of supporting a part of the weight of the spleen during exercise, in the way of walking and riding, which are highly useful to persons affected with spleen disease: it diminishes the stagnation of the blood in the spleen, and facilitates the resolution of its congestions.

The diseases of the spleen are occasionally idiopathic, and like other organs it is subject to different inflammatory diseases of a local character; but in the large majority of cases the lesions of this organ depend rather upon a constitutional disturbance, such as a general tuber-

culous disease, than upon any cause peculiar to the organ. We therefore infer, that the spleen, which possesses so little susceptibility to disease in itself, is singularly liable to participate in the general alterations of the economy, whether of an acute or chronic kind. The cause of this connexion does not seem difficult to explain : the spleen consists almost wholly of blood, and the circulation through its loose tissue is more like percolation than actual nutrition; hence it is emphatically subject to diseases affecting the condition of the blood, of which liquid the organ mainly consists.

Whether the alteration of the blood be a mere diminution of the quantity of red globules and fibrin, as in intermittent fever, or an alteration of a different and more important kind, as in typhus and typhoid fever, the spleen is softened in the acute stages of the disease : but in the more chronic varieties, especially of intermittent fever, the change is different, and the tissue is both hypertrophied and hardened ; as there is no chronic continued fever, an alteration of an analogous kind does not exist. Softening, and the gradually breaking down of the tissue of the spleen, is by no means confined to these fevers; it is common in certain varieties of malignant dysentery and in scurvy, and requires no other treatment than that which is appropriate to the cure of the preceding affection.

In the chronic induration of the spleen, there is often considerable tendency to inflammatory action, differing very much from acute inflammation. In these cases the treatment should be of a twofold nature :—To relieve the local disorder by cupping, leeching, and afterwards repeated applications of blisters over the spleen, and to alter the general disorder of the economy by appropriate remedies. The latter must be selected chiefly with reference to the cause of the disease : if this be intermittent, as is commonly the case, the sulphate of quinine and iron will be found most effectual, with laxative doses of rhubarb ; vegetable tonics are also, at times, of service with adjuvants to the tonic treatment. But the mercurial preparations are almost without exception of injury.

The invigorating alteratives of a hygienic kind, which are of so much benefit in other chronic affections, are of service in this disease, and sometimes succeed when all others have failed : these are journeys to healthy countries free from malaria, and sea voyages.   G.

DISEASES

OF

THE URINARY ORGANS.

In treating of diseases of the urinary organs, with reference to the precise object of the present work, it will be necessary to confine the attention to such diseases as come properly under the cognizance of the physician. With this view the whole subject of diseases of the kidneys will be considered in its details. Diseases of the bladder will then be investigated; under which branch, however, there are scarcely any topics but what may be touched on slightly, since they are connected rather with the practice of surgery than with the practice of physic. The diseases of the urethra and neighbouring parts, which belong entirely to the domain of the surgeon will be regarded only in so far as they are concerned in the diagnosis of diseases of the bladder or kidneys.

PROPERTIES OF HEALTHY URINE.

Average daily quantity. — Chemical constitution. — Density.

BEFORE entering on any part of this inquiry, a few remarks will be required upon the healthy constitution of the fluid, whose secretion and discharge the kidneys, the bladder, and their adjuncts are mainly intended to accomplish. It is scarcely possible to take a single step with confidence in the diagnosis or treatment of diseases of the urinary organs, without attentively studying the deranged states of the urine; and in order to appreciate correctly the inferences to be founded on these states, it is indispensable that a correct knowledge be formed of its healthy condition. Nor can the reader be safely left here to gather the requisite information from physiological authors, as might naturally be presumed; for, in many treatises on physiology, some points of considerable practical importance have been either overlooked, or are involved in doubt and contradiction.

Healthy urine presents many characteristic properties, which on the whole are uniform in kind, but very variable in degree. Taking for the most healthy and perfect example of urine, that of a robust man between adult and middle age, of active habits, and observing a diet moderately dry, little or not at all alcoholic, and with a full proportion of animal aliment, it will be found, at least in a majority of instances, that the average daily quantity of urine is about thirty-five ounces fluid, the average density about 1029, the average solid contents about six and two-thirds *per cent.*, and the average daily discharge of solids not quite two ounces and a half avoirdupois. Such urine is always of a lively wine-yellow colour, transparent and limpid when newly passed, of a

strong, aromatic, almost violaceous odour when warm, which becomes disagreeable and peculiar on cooling, of an intense, peculiar, bitter, saline taste, slightly acid in its action on vegetable colours, apt to become somewhat turbid when cold, and alkaline and ammoniacal when long kept. It is composed of water, urea, lithic acid in union with ammonia, free carbonic acid, alkaline sulphates, phosphates, hydrochlorates, and lactates, phosphates of lime and magnesia, colouring or extractive matter, and sometimes a trace of silica and fluoride of calcium, with floating vesical mucus. The relative proportions of these numerous ingredients probably vary to a great extent; but the only positive information yet possessed on the subject is that derived from the solitary analysis of Berzelius made thirty years ago, according to which 1000 parts of healthy urine, containing 67 of solid matter, are composed of 30 urea, about 17 of lactates and colouring matter, $4\frac{1}{2}$ chloride of sodium, nearly 4 of sulphate of potash, about 3 of sulphate of soda, nearly the same of phosphate of soda, $1\frac{1}{2}$ phosphate of ammonia, as much hydrochlorate of ammonia, 1 of the phosphates of magnesia and lime together, and 1 of lithic acid. The silica and fluoride of calcium admitted as ingredients by some physiologists are not always present, and are probably accidental. Assuming this analysis to represent the composition of healthy urine, it follows that there is daily discharged by the kidneys 1090 grains, or nearly two ounces and a half avoirdupois of solid matter, of which 510 grains, or exactly one ounce and a sixth, consist of urea.

The accuracy of this view of the properties of healthy urine will be called in question by many. Parallel statements at least have been questioned of late; and a very different account has been given of the healthy constitution of this fluid. It would be improper to discuss fully the merits of the question in the present place, more especially as the facts are still wanting to justify a confident conclusion. But some allusion to it is nevertheless indispensable; because much of what will be brought forward afterwards, relative to the pathology and treatment of urinary diseases, must necessarily bear a reference to some assumed standard for the properties of the urine.

By some chemists, then, the density of healthy urine has been stated so low as 1010 (*Thomson*). Others, preferring to state a general average, represent this to vary between 1010 and 1015 (*Prout*),—or at 1015 for adults, and 1010 inclusive of children (*Willis*),—or between 1012 and 1017 (*Venables*),—or at 1016 (*Macgregor*,)—or so high as 1025 (*James Gregory*, secundus). Few admit that the description and analysis of Berzelius are applicable to healthy urine. Many authors on this subject, however, appear to have taken an erroneous method of arriving at accurate and practically useful results. The determination of the characters of average healthy urine in the gross is almost impossible, and at all events of little value in physiology, and of no importance in relation to medical practice. The proper object of inquiry is the average in various circumstances of perfect physical developement, and the most perfect discharge of every bodily function. Such seems to have been the case held in view by Berzelius in his analysis; and such is the case supposed in the sketch given at the outset of this exposition. Every observation yet made by the writer tends to show, that if the conditions there specified be attended to, the description which has been adopted will be found to apply very nearly. But it is not meant to be alleged, and no accurate inquirer will maintain, that such urine is the only kind of healthy urine. On the contrary, very great deviations may take place from the perfect standard assumed above, and yet without being incompatible with the full enjoyment of health. The density of urine and the proportion of its solids are apt to be increased by hot weather, by much exercise, especially if it excite free perspiration, by a very dry diet, by a highly animal diet, by particular articles of food, such as cheese and other highly azotized substances, by the digestion of particular meals, especially that of dinner, and by obscure constitutional causes. On the contrary, it is diminished by cold weather, by a sedentary occupation, by a watery diet, by too much

vegetable food, by certain articles of food, and still more of drink, especially acids and alcoholic fluids, by certain meals, such as breakfast, and by unknown constitutional circumstances. Further, the density of urine is low in childhood, higher in youth, highest in manhood, and generally lower again in old age. It is lower in females than in males. It is at its average in the morning on awaking, provided no disturbing cause had come into action the previous evening; it falls considerably after breakfast; it rises again gradually after mid-day; it sinks again immediately after dinner, but in a few hours rises higher than at any other time; and in the course of the night it gradually returns towards its average. When several influencing causes concur, the deviations that ensue are excessive; so that the extremes for healthy urine were correctly placed first by *Cruikshank* and afterwards by *Dr. Gregory* at 1005 and 1033. Unless all the causes are taken into consideration, it is impossible to arrive at a knowledge of the true average density of healthy urine.

Authors, however, have seldom mentioned whether they took them in account or not; and therefore most of the late statements on the subject are little entitled to credit. Of all the inquiries yet made, that of *Dr. Gregory* has appeared to the writer the most worthy of confidence; for, besides having been conducted on a great scale, they were entered upon, as the writer happens to know, with a due knowledge of disturbing causes. According to *Dr. Gregory*, the extremes for adult and middle age are 1005 and 1033, the greatest range for the same individual 21 degrees, the ordinary range between 1016 and 1031, and the mean of 363 experiments on fifty individuals 1022·5. It is probable that this average is rather low than high, because the writer knows that many of the experiments were made soon after breakfast, and comparatively few after dinner. And, accordingly, the average for five individuals, whose urine was tried between twenty and fifty times each, was 1025·2. This last number will probably indicate the average density for manhood in the middle station of life, where it is the common practice to take much more food, and especially a greater proportion of animal food, than is absolutely required.* It is much to be desired, however, that in any future inquiries, which may be undertaken on this subject, observers would not confine themselves, as all have done hitherto, including even *Dr. Gregory*, to one single general average; but that, proceeding from the average in what has been assumed above as the condition for the most perfect secretion of urine, they would endeavour to ascertain the averages for all the most important circumstances formerly alluded to, which are not incompatible with its healthy state.

Variations in the density of urine are usually compensated in a state of health by variations in its quantity; the general result of which is that in different in-

* It would be no difficult matter to form a probable conjecture as to the fallacies which have led some late authors to fix the density of healthy urine so low as 1015, 1012, or even 1010. But the question, if it is still to be considered open, must be settled by fresh facts, not by conjectures and inferential suppositions, such as have been indulged in too much, perhaps, by some of the authors alluded to. As an example of the looseness of this method of inquiry, it may be well to refer shortly here to the late learned and generally exact work of *Dr. Willis*. Objecting to the statements of Berzelius, and of the writer (*Edin. Med. and Surg. Journ.* 1829), that healthy urine has a density of 1029, *Dr. Willis* insists that the urine examined must have been unusually high in density, and probably the highest of the day; because, otherwise, the quantity discharged, amounting in the latter case to thirty-five ounces, would imply, according to *Chossat*'s researches into the ratio subsisting between the aliment and the solids of the urine, that the solid food taken in twenty-four hours amounted to the enormous sum of eighty ounces, or at least thrice the common average. The source of fallacy in this reasoning is not far removed from observation; but the fact is a better answer. The writer's experiments were made with the average urine of the total quantity passed in seven continuous days, at the end of September, in the case of a healthy robust male of the middle ranks, in his thirtieth year, accustomed to active exercise, and observing the usual diet of his station and age, that is, consuming between twenty-four and thirty ounces of solid food daily, rather sparing in the use of liquids, and abstaining for the time from wine and stronger alcoholic fluids.

dividuals, situated alike as to food and exercise, the amount of solids discharged daily with the urine is pretty nearly the same. There are undoubtedly many exceptions, depending chiefly on constitutional causes. But it will be found on the whole, that where the food and exercise are nearly the same, the urine if low in density is above the average in quantity, and *vice versâ;* and that a pretty exact compensation is thus established. The average range of the daily quantity is probably between thirty and fifty ounces avoirdupois; but there are few observations on this head. According to *Rayer* the extremes in health are twenty-one and fifty-seven ounces. Equally meagre is the information procured of the average discharge of solids in various given circumstances. This however is one of the most important conditions to be determined with a view to the diagnosis and treatment of urinary diseases. A knowledge of the density and quantity indeed is chiefly serviceable, at least in many circumstances, as leading easily to a knowledge of the daily discharge of solids. It has been already mentioned that in the most favourable conditions for health, physical developement, and the perfect discharge of the functions, the solids discharged amount to nearly two ounces and a half avoirdupois; and the quantity probably falls seldom short of one ounce and a half, unless in individuals of small frame, or those who live sparingly and take little exercise. When the quantity of food exceeds what is requisite for supplying the growth and waste of the body, the discharge of solids is always increased; and it is probable that a small excess of food is sufficient to render the increase considerable.

An increase in the quantity of urine, with a decrease of its density, infers a diminution in all its sensible properties; and it is not so liable to become turbid on cooling. The relation of its ingredients to one another may not however be altered; but this will depend upon the cause of dilution. Accurate researches are still wanted as to the effect of various causes of dilution on the relative proportion of the solid contents of the urine. One important fact has been determined chiefly by the interesting researches of *Magendie*,—namely, that vegetable food, which increases the quantity of the urine, diminishes greatly the proportion as well as quantity of the lithic acid in it, and probably also of its urea. A decrease in the quantity of the urine, with an elevation of its density, has precisely the opposite effects with those just related; and an animal diet acts conversely to a vegetable diet upon the quantity and proportion of lithic acid and urea. A vegetable diet diminishes, and an animal diet increases, the proportion of urea and lithic acid, even beyond their mere effect in increasing or diminishing the quantity of the urine, or its density. Particular articles of vegetable or animal food have in all probability remarkable effects of the same nature; but it is greatly to be lamented, for the interests of medical science and practice, that this department of inquiry has been little cultivated. Among the articles which increase the proportion of lithic acid none are more efficacious than pastry, and above all cheese.[*] It shoud be remembered that the proportion of lithic acid in the urine may be much increased, without the urine being visibly affected, so long as it is quite fresh and warm. In fact, healthy urine of the density 1029 may be made to dissolve a considerable quantity of lithate of ammonia by agitation at 100° F., and still more by ebullition. But it parts with the excess on cooling, and then becomes very turbid; and if the cooling take place slowly, a gritty or semicrystalline deposit of lithate of ammonia is formed. When lithic acid exists in unusual abundance in healthy urine, it is always present, as indeed is probably the case in every circumstance, under the form of lithate of ammonia. After a deposition has taken place on cooling, an excess is often still retained in solution. This will be discovered by nitric acid, which, appropriating the ammonia, sepa-

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[*] According to *Rayer* and *Guibourt*, the urine of infants at the breast is almost destitute of urea, and the proportion of this principle to the other ingredients gradually increases towards manhood.

rates the lithic acid in the form of a cloudiness or flaky precipitate. Healthy urine possesses the property of dissolving a considerable excess of one of its earthy ingredients, the phosphate of ammonia and magnesia. It admits of doubt, whether such excess ever occurs to any material extent in the healthy state of the secretion; but when present, it is discovered by the action of heat followed by nitric acid; for ebullition continued for a few seconds separates a flaky white precipitate, which a drop or two of the acid speedily redissolves. The separation of the precipitate, under the action of heat, is probably owing to the disengagement of carbonic acid, by which the ammoniaco-magnesian phosphate is kept in solution.

DISEASES OF THE KIDNEYS.

THE diseases to which the kidney is liable are some of them functional, others organic. The functional diseases which have been chiefly admitted into nosographical works are gravel and calculus, diabetes, hæmaturia, and suppression of urine. The organic diseases have been hitherto little studied. The only frequent organic disease is granular degeneration; and the others which have been chiefly noticed are nephritis or inflammation; tubercles; urinary and serous cysts; malignant diseases of the nature of cancer, fungus and cerebriform deposition; melanosis, cartilaginous and osseous degeneration, congestion or hyperemia, and atrophy, most of which disorders are interesting chiefly as anatomical derangements,—their symptoms and treatment being little known.

FUNCTIONAL DISEASES OF THE KIDNEYS.

Morbid states of the urine.—Variations in the density and solid ingredients.—Sensible qualities.—Urea.—Lithic acid.—Earthy phosphates.—Impregnation with blood.—Albumen.—Sugar.—Bile.—Milk.—Oleo-albuminous matter.—Oleaginous or fatty matter.—Pus.—Spermatic fluid.—Carbonate of Ammonia.—Nitric acid.—Oxalate of lime.—Carbonate of lime.—Melanic acid.—Cystic oxide.—Siliceous deposits.—Hydrocyanic and ferrocyanic acids.—Phosphorus.

THE urine as described in the preceding pages is subject to important modifications, the result of morbid action, either primarily excited in the kidneys themselves, or induced secondarily by diseases in other organs of the body. There is scarcely any end to the variety of morbid states which may thus be occasioned; but the most remarkable of them are the following.

Sometimes the quantity of the urine is greatly increased, occasionally to forty or fifty pints a day; and this without its constitution being changed. Sometimes, on the other hand, its quantity is much reduced; or it is even entirely suppressed. The density is often preternaturally great, reaching occasionally to 1055 or perhaps even higher. Frequently too it is excessively low, and in some cases has been observed at 1001, or even almost as low as that of water. The daily discharge of solids is often unusually great, and has been known to reach so high as thirty-six ounces avoirdupois; while on the contrary it is often very small, so scanty at times as only eleven grains.

It is often so loaded with its ordinary constituents as to deposit a copious sediment on cooling. Sometimes, owing to a superabundance of one or more

of them, it is muddy even when first passed. Its colour is often altered to blood-red, cherry-red, brown, or orange. Its odour is sometimes ammoniacal from the first moment it is passed, or becomes so in an hour or two ; or it is feeble ; or like that of honey ; or modified in a variety of ways by particular articles of food and drink. Its taste is also often altered, being sometimes unusually alkaline, or preternaturally saline, or feeble though otherwise natural, or distinctly sweet. Its action on the vegetable colours is also often altered ; instead of rendering litmus paper red, it turns reddened litmus purple, which is owing to the presence of an excess of ammonia in the form of carbonate.

Of its ordinary ingredients the *Urea* is perhaps most frequently affected in quantity. Sometimes it appears nearly or altogether wanting ; sometimes twice or thrice the average for the most perfect urine is passed daily, in which case the density is usually very high, namely 1032 or even more, and the proportion of urea is so great that in cool weather nitric acid will cause crystallization of nitrate of urea without the fluid being concentrated. The *Lithic acid* is also very often altered in quantity. Sometimes it is nearly wanting ; but a much more important condition is superabundance of this principle, in which case the urine either forms an excessive deposit on cooling, or yields a muddiness or precipitate with a few drops of nitric acid, or contains gritty particles, or even small calculous concretions of lithic acid and lithate of ammonia, at the moment of being passed. Lithic acid exists less frequently in the free state in urinary deposits than in a state of combination with ammonia. When free, the deposit does not necessarily depend on the lithic acid being present to excess in the urine ; for it may be simply occasioned by an excess of a stronger acid, such as the muriatic or phosphoric, disengaging the lithic acid from its natural state of combination with ammonia. The uncombined lithic acid tends to the crys-talline form. It is known by being insoluble in muriatic acid, sparingly soluble in solutions of the alkaline carbonates, easily soluble in solution of potash, without evolving ammonia, and convertible by heat and nitric acid into a solution which leaves a red residuum when evaporated, and then forms a purple solution with ammonia. It is seldom all uncombined however in lithic deposits, being usually either in part or altogether united with ammonia. Deposits of this nature are generally amorphous, seldom crystaline, and present the same chemical properties with uncombined lithic acid, except that they dissolve readily in solutions of alkaline carbonates, give off ammonia when dissolved in solution of potash, and are more soluble in water. The *Earthy Phosphates* are more rarely increased in amount. Sometimes they abound so much as to render the urine milky when passed ; more frequently they render it opalescent, and afterwards form a scanty white sediment after a few hours of rest ; occa-sionally they do not separate for a few hours, the urine being previously clear, in which case it is commonly observed that this fluid becomes in the first place ammoniacal ; occasionally too they do not separate for a long time, but may be detected in the form of a white flaky precipitate by boiling the urine. The deposit in all these cases consists very rarely of phosphate of lime only, often of the phosphate of magnesia and ammonia, frequently of both together. In certain circumstances the earthy matter is discharged not in the form of an impalpable sediment, but in that of a gritty powder, or in calculous masses of appreciable magnitude. The phosphates are known by being soluble in acetic acid and muriatic acid, but insoluble in aqua potassæ. If ammonia is disen-gaged by the potash, the ammoniaco-magnesia phosphate may be presumed to be present. If the solution in acetic acid precipitates with oxalate of ammonia, phosphate of lime is present. If, after the addition of oxalate of ammonia, a precipitate be occasioned by ammonia, the ammoniaco-magnesian phosphate is present. If both reagents occasion a precipitate, the sediment contains both phosphates. A mixture of the two is remarkably fusible before the blowpipe flame.—Another natural ingredient which sometimes abounds in the urine, is *Mucus*. When very abundant, the urine is always alkaline and ammoniacal ;

and its condition then commonly depends on organic disease in the kidneys or bladder. Mucus, in only moderate excess, sometimes remains in a state of solution or invisible suspension in the urine; but it may then be detected by the urine being ropy, remaining unaltered by boiling, and becoming cloudy when treated with a few drops of acetic acid. At other times mucus puts on the ordinary characters of that principle, and after a short period of rest is found adhering firmly to the vessel in the form of a glairy ropy mass. In other circumstances again, a substance, which has been considered mucus somewhat altered in character, exists in the form of a very fine powder, which communicates to the urine a peculiar opalescent appearance, is slowly and only in part deposited under long repose, disappears under the action of alkalis, and becomes more distinctly flocculent or powdery under the action of heat or acids. By some these particles have been considered to be the scales which form the surface of the mucous epithelion of the bladder.—The inorganic acids contained in the urine, especially the *Muriatic* and *Phosphoric acids*, are sometimes increased in quantity. They do not however exist in the free state, but decompose the salts of the weaker acids, namely, the lactic and lithic acids, thus giving rise to lithic deposits. It has been already mentioned, that uncombined lithic acid is sometimes separated in the form of crystalline deposits from the action of muriatic acid or phosphoric acid in excess upon the lithate of ammonia, although that salt be not superabundant.

The urine is also liable to various morbid impregnations, which it never presents in the healthy state. Some of these are soluble, others insoluble, and therefore sedimentary. A common impregnation is with *Blood*. This may be either so small in quantity as to communicate a smoke-brown or cherry-red tint, without separating at all under rest, or may be so abundant as to be also detached at once in the form of a sanguinolent deposit, which is sometimes even coagulated, or may almost entirely take the place of the urine, so that the discharge, on standing a little, becomes one uniform mass of loosely coagulated blood. In the first of these cases, blood may be known by ebullition occasioning a dirty grayish-brown flocculent precipitate, and at the same time removing the adventitious colour. Another frequent impregnation is *serum*, or more correctly speaking, *Albumen*. It is possible that the presence of a small proportion of albumen is sometimes consistent with the healthy state of the secretion,—scarcely however if the impregnation is habitual. When scanty, it is detected by the action of heat and the mineral acids; being separated in the form of a fleecy powder when the urine is heated near to its boiling point, and remaining undissolved on the subsequent addition of nitric acid. The last character is requisite in order to distinguish this principle from an excess of earthy phosphates, as these are easily separated by heat in the form of flakes. Albumen, when present, varies greatly in its proportion; being often less than one part in 1000, and at times so great as twenty-seven parts; in which case the urine is observed to form a uniform and pretty firm jelly on being heated. A remarkable ingredient of one variety of urine is *Sugar*. This principle usually renders the secretion superabundant and often excessively so, sweet to the taste, of high density, and fermentable with yeast. Its proportion and quantity vary very much. In a case not long ago under the writer's care towards thirty ounces of sugar must have been discharged daily for several days together. According to *Dr. Prout* a moderate impregnation with sugar is sometimes met with in old dyspeptics or gouty people, without occasioning diuresis or any serious illness; and this statement is confirmed in some measure by *Dr. Venables*. But much more generally sugar in the urine is associated with great increase of its quantity, and with fatal constitutional derangement. *Bile*, or at least the colouring matter of the bile, is present in the urine of certain diseases, and communicates to it an amber or gamboge tint, the true cause of which is known by nitric acid rendering it green, and by white linen being stained by it yellow. *Milk* is a very rare and doubtful ingredient of morbid urine. It may be detected by its bluish-white colour, the

presence of milk-globules when it is examined by the microscope, the effect of acetic acid in coagulating it, and the want of any similar effect from heat. There can be no question that the greater part of the recorded cases of milk urine have been cases of deception. In an instance of the kind, at one time under the writer's care, the patient, a female, was thought to pass milky urine, and some believed her tale, though she occasionally had the impudence to produce pure milk as the discharge from her bladder. She was in the end clearly proved to be an impostor; but it was on several occasions impossible for days together to discover where she got the milk to carry on the deception. There is another morbid impregnation, however, which has been often mistaken for milk, and which is of rather more common occurrence, though still rare, namely an *Oleo-albuminous* matter, probably analogous to that which occasions the remarkable milky appearance at times observed in the serum of the blood. The urine in such cases resembles milk in colour and consistence. It is commonly acid and decomposes more readily than natural urine. On standing for a little it sometimes continues homogeneous; at other times it coagulates into a mass like blanc-mange, which gradually separates into an opaline fluid and a fibrinous matter apparently differing little from perfect fibrin; and at other times again it either deposits or throws up a stratum of thick cream-like matter. The coagulum, deposit, and cream present characters varying between those of fibrin and albumen, but contain also some oily or fatty matter removable by sulphuric ether. The fluid part is usually coagulable by heat, always coagulable by acids, and when acidulated with acetic acid yields a precipitate to ferrocyanide of potassium,—which last property seems to associate the coagulable principle rather with fibrin than with albumen. This singular variety of urine has been termed by *Prout*, who first accurately described it, "chylous urine," and is considered by him to owe its peculiar characters to chyle passing into the blood without undergoing further elaboration, and being discharged, like other foreign matters in the circulation, by the kidneys.

A simple *Oleaginous* or *fatty* matter has been occasionally found in the urine, forming a pellicle or scum on it a short time after it is passed. This has been supposed to arise from steatomatous tumours adhering to the inside of the bladder. More generally it is a fallacious appearance, and in hospitals, particularly, is owing to oil having inadvertently been kept in the vessel used to receive or preserve the urine. Another of the rarer morbid ingredients of the urine is *Pus*. This is often distinguishable by its yellowish or greenish-yellow colour, and the rapidity with which it sinks and arranges itself in a distinct substratum. But sometimes it is unusually white, and may then be confounded with other urinary deposits. It may be known in such cases by being easily diffusible, but not soluble in the urine; by resisting the action of acids; by becoming a flocculent mass when heated; and, in doubtful cases, by the size and form of its globules, which are spherical, somewhat granular, and twice the diameter of the blood-globules. It is also said that pus yields oily matter to ether, which mucus does not. The *Spermatic fluid* is said to be sometimes met with in the urine. There is however no good practical method of recognising it, although a test of this kind would be obviously desirable in certain cases. *Carbonate of ammonia* is not an uncommon ingredient. It is derived from the urea, which in certain diseased states appears to be secreted with its properties imperfect, and, among the rest, more prone to decomposition. It may be often remarked by the ammoniacal odour of the urine, after standing for a few hours; but sometimes the same test will detect it in what is quite fresh and newly passed. Whenever the odour of urine is ammoniacal, an acid disengages a large quantity of carbonic acid. This condition of the urine is almost universal when the earthy phosphates abound as a sediment. *Nitric acid* is said to be an occasional ingredient of urine, having been apparently met with in some forms of inflammatory fever, and, also, according to Dr. Prout, in some purple deposits. One of the most interesting morbid ingredients of the urine is

Oxalate of lime. This constitutes the material of certain forms of gravel, and more frequently of certain calculi. Chemists and physiologists were long at a loss to account for its presence upon chemical grounds; but the difficuly is removed, since Liebig and Wöhler lately proved that oxalic acid is formed from urea by the action of certain oxidating agents, such as peroxide of lead. It always exists in the form of a deposit or concretion. Some have supposed that free oxalic acid may at the same time be occasionally present, but this has never been proved except where the acid was swallowed, which Krimer showed may pass out unchanged with the urine. Oxalate of lime is known by being insoluble in aquæ potassæ, insoluble in acetic acid, soluble in nitric acid, and convertible at a red heat into carbonate of lime. *Carbonate of lime* is a rare ingredient of urinary deposits. It is to be detected by dissolving with effervescence in muriatic acid, and forming a solution which is precipitated by oxalic acid in excess. A considerable variety of *Coloured sediments* have been observed. A rare variety is the *Black sediment*, first carefully examined by Dr. Marcet, and traced by him to a particular acid which he has named melanic acid. The *Blue sediment*, also very rare, is probably owing to the same principle. The *Red* and *Purplish* sediments are more frequent, indeed far from uncommon, and have been referred partly by Dr. Prout to the alkaline purpurates, produced by nitric acid converting the lithic into the erythric or purpuric acid, and partly by Vogel, Berzelius, and others, to peculiar animal colouring matters. They are commonly associated with an excess and deposition of lithate of ammonia. They are often observed when inflammatory action is present, and seldom in any other circumstances. Among the rarer sedimentary matters may be reckoned the *Cystic oxide* of Wollaston, or cystine of later authors. It is probably not so rare as has been hitherto thought, because till of late the attention of practitioners has been chiefly confined to this principle as existing in the form of calculi. It has been recently met with by *Dr. Prout, Dr. Venables,* and *Dr. Willis,* in the form of fine impalpable powder, sometimes constituting a deposit, sometimes a scum on the surface, sometimes a floating cloudiness. It may be suspected to exist, where the urine is greenish-yellow, muddy, and of a mixed odour of fetid urine and the sweet briar. But the true nature of the deposit is to be determined by its being soluble in diluted muriatic acid, insoluble in tartaric, acetic, or citric acid, soluble in aqua potassæ, precipitable from this solution by solution of bicarbonate of ammonia, and by its emitting a very peculiar odour when heated. Sometimes the urine presents small *Prostatic calculi* derived from the prostate gland. These have a considerable resemblance to lithic concretions. They are usually yellowish, sometimes earthy and friable, sometimes firm, compact, and polished. They may be known by their appearance, by their being homogeneous, not in concentric layers, and by their containing no other phosphate except that of lime, which very rarely exists alone in true urinary calculi and deposits. *Siliceous deposits* are enumerated by most authors among the morbid ingredients of the urine. There is hitherto, however, no satisfactory evidence that silica forms a material part of any urinary sediment. It will be mentioned afterwards, under the head of GRAVEL, that almost every instance of siliceous gravel that has come under the observation of recent authors, has proved to be a case of imposition. *Hydrocyanic* and *Ferrocyanic* acids have been found in one or two instances in the urine; and a few observations have been made of luminous urine, which was supposed to owe this property to *Phosphorus.* But these ingredients are merely subjects of curiosity.

The urine, besides containing a morbid proportion of its healthy ingredients, and various morbid ingredients derived from the animal system itself, may also be impregnated with a great variety of materials derived from without, and generally through the medium of the food and drink. It would be out of place to investigate this department of the subject in detail. Those facts alone are here of importance which may affect the diagnosis of urinary diseases. It will

be sufficient, therefore, to mention that asparagus imparts to the urine, as every one knows, a peculiar fetid odour allied to that of gangrene; that rhubarb, madder, beet-root, syrup of corn-poppy, cherries, mulberries, logwood, and probably other coloured vegetable substances, communicate a cherry-red colour, like a tint of sanguinolent urine; from which, however, these coloured urines may be distinguished by retaining their hue under ebullition, and that occasioned by rhubarb by muriatic acid rendering it yellow.

Among the many morbid or preternatural contents of the urine, it is particularly worthy of remark, that all those which are organic in their nature have an intimate relation to one another, as well as to the natural constituents of the urine, urea and lithic acid, in their elementary constitution. Urea, lithic acid, oxalic acid, albumen, sugar, cystic oxide, carbonate of ammonia, are so related in their atomic constitution, that simple changes will convert them into one another. Hence the facility, otherwise incomprehensible, with which the urine furnishes so great a variety of morbid products.

Of the numberless morbid affections of the urine now enumerated, and arising from functional disturbance of the kidneys, some are obviously occasioned by disease of the kidneys themseves, as the primary morbid condition. Others are well ascertained to be entirely secondary, and depend on the concurrence and pre-existence of disease in other organs of the body; in which case the condition of the urine is merely symptomatic. And further, among the conditions which depend primarily on disease of the kidneys, some are connected as frequently with organic as with functional disorders in that organ. Authors, in treating of urinary diseases, or of the morbid states of the urine, have not always attended to these distinctions. Nor in the present state of pathology, as applied to the kidney, would it be either easy or practically useful to observe them. A considerable number of the morbid affections of the urine may be passed without notice in the subsequent details, because they are merely symptomatic of diseases not renal, and occasion no annoyance to the patient. It will be sufficient to make mention of those affections, which are either connected with primary functional disturbance of the kidneys, or though secondary to other diseases, become of primary consequence through the local disturbance which is excited. These are chiefly gravel and calculus, diabetes insipidus, diabetes mellitus, hæmaturia, albuminous secretion, and suppression.

CALCULOUS DISEASES.

It has been mentioned that the urine in many circumstances deposits as it cools a large quantity of insoluble matter, which is commonly loose and pulverulent, but sometimes concrete, sandy, and obscurely crystalline. This state of matters may exist without occasioning any annoyance. But when the insoluble matter is passed along with the urine, and is found in it while still warm in the form of fine powder, sandy particles, or little stony masses, symptoms more or less severe arise, and the disease named *Gravel* is constituted. When the hard masses attain a moderate size, and are retained for some time or permanently in the kidneys, bladder, or urinary passages, the disease is termed *Calculus* or *Stone*. Both, but especially the former, are disorders of frequent occurrence.

GRAVEL.

Definition.—Symptoms, general and local.—Condition of the urine.—Varieties of gravel and
their comparative frequency.—Causes and pathology.—Prognosis.—Treatment.

GRAVEL may be defined, *the discharge of pulverulent or gritty matter with the
urine, occasioning symptoms of irritation in the kidneys, bladder, and urethra.*

The matter discharged varies very much in its characters ; being sometimes
an impalpable powder, sometimes a collection of gritty particles like sand, some-
times formed in part of small calculi of appreciable magnitude.   Its composi-
tion is also exceedingly diversified.   The most frequent species of gravel is
lithate of ammonia, with or without free lithic acid, or pure lithic acid ; next to
this, in point of frequency, is the ammoniaco-magnesian phosphate, or rather a
mixture of this with phosphate of lime ; next comes the oxalate of lime ; a com-
mon kind of gravel is composed of several sorts, such as the earthy phosphates
with lithate of ammonia, or the latter with oxalate of lime ; pure phosphate of
lime is rare, as also carbonate of lime and cystic oxide ; and siliceous gravel is
of doubtful occurrence.

Symptoms.   The symptoms of gravel are partly local and partly general.
Some of them are common to all kinds of gravel, others are peculiar to certain
varieties.   The simplest method of discussing the subject will be to treat first of
the symptoms of the most common variety, where the insoluble matter is the
lithate of ammonia or lithic acid, and then to specify any modifications which
may arise in other circumstances.

The symptoms of a general nature, or not referrible directly to the renal
organs, are such as indicate disorder of the function of digestion, and disturb-
ance of the circulation.   These, however, are sometimes not present at all, and
the sufferings of the patient are entirely confined to the organs connected with
the secretion and discharge of urine.   The usual symptoms of indigestion which
occur are acidity of the stomach after meals, sense of weight in the epigastrium,
eructation of the food, defective appetite after a time, constipation, a loaded
tongue, headache and giddiness, drowsiness, lassitude, and oppression.   The
ordinary state of the circulation is one of excitement, occasioning frequency and
fulness of the pulse, pulsation in the head, some flushing of the features and suffu-
sion of the eyes, with heat of skin, restlessness and general wretchedness, espe-
cially at night.   The local symptoms are dull pain and feeling of weight in the
loins, with occasional darting pains there, increased at times by jolting or other
sudden movements of the body, but not by mere action of the neighbouring mus-
cles, or by pressure, unless made heavily ; occasionally acute and at times over-
powering deep-seated pain, midway between the loins and pubes, or where this is
insected by a line from the umbilicus to the crest of the ileum, accompanied fre-
quently with tenderness over a corresponding circumscribed spot upon the ab-
domen ; wandering pains behind the pubes, heat and irritation at the neck of
the bladder, and itching and pain at the termination of the urethra ; pain and
often also retraction of one or both testicles, the occasional discharge of blood-
red urine, or of little bloody clots, or even considerable hemorrhage ; the appear-
ance in the urine, even when newly passed and still warm, of sandy powder,
obscurely crystalline grains, or little calculi, commonly of a grayish or reddish-
brown colour, but sometimes white or dark brown, and occasionally in distinct
but irregularly formed crystals ; frequent calls to pass urine, often preceded by
a paroxysm of pain ; difficult micturition, occasionally interrupted ; often severe
sickness accompanying the fits of pain, with depression and anxiety.   Most of
these symptoms are connected with the presence of depositions in the kidneys

or with their passage generally ; but the acute fits of pain between the region of the kidneys and the bottom of the pelvis arise from a calculus being arrested in its course down the ureters.   The patient's sufferings are always very apt to be increased by brisk exercise, especially however by all brisk agitation of the body, such as running, leaping, and riding on horseback.   They are also commonly increased by high living.   On the contrary, rest and abstinence, or plain living, relieve them.   It is an interesting fact, that the general and even also the local symptoms are for the most part least troublesome, and the patient enjoys the best health, when lithic acid is abundantly deposited from the urine ; and sometimes a profuse discharge of gravelly deposit puts an end for a long time to long previous suffering.

The urine in the ordinary run of cases is rather scanty, high-coloured, high in density, so as often to reach 1030 or even 1033, and abounding both in urea and in lithate of ammonia, the acid of which is shown to be in excess by nitric acid occasioning a cloudiness and flaky precipitate.   A high density, however, with abundance of solids, is not essential to the developement even of the ordinary forms of gravel ; it is sufficient that the lithic acid be superabundant.   In other forms of gravel, the density is even under the general average.   The urine, further, in the great majority of cases, is somewhat acid in its action on vegetable colours, of a strong, pure, characteristic urinary odour, and much disposed to become turbid on cooling.   In a few cases it is worthy of remark, that the symptoms of gravel occur, though in a minor degree, where the urine furnishes a copious concrete sediment on cooling, even although no insoluble matter be passed along with it, and where the history of the case, in other respects, does not favour the presumption of concretions being present in any part of the urinary organs.

Such are the leading symptoms in the most familiar varieties of gravel ; namely, the *lithic gravel*, or that composed of lithic acid and lithate of ammonia. This is by far the most frequent form of the disease, so that, indeed, one may practise long and extensively without meeting with any other.   Next in point of frequency perhaps is the *phosphatic gravel*, where the deposit consists of phosphate of lime or the phosphate of magnesia and ammonia, or of both compounds intermingled ; and the only other variety, common enough to be of serious practical importance, is the *oxalic gravel*, composed of the oxalate of lime, which in some districts seems more common than the phosphatic species. In oxalic gravel there is usually less constitutional derangement, either in the form of fever or indigestion, before the local symptoms first show themselves ; the fit of gravel, as it is called in common speech, comes on for the most part without the attention having been previously drawn to any unnatural condition of the urine ; and when the urine is at last examined it is found to be tolerably clear when passed, and not to yield much sediment on cooling.   The constitutional derangement however, such as it is, puts on at first the phlogistic character as in lithic gravel.   When the oxalic diathesis has been some time present, according to *Dr. Prout*, the constitution soon suffers more materially : there is a tendency to nervous depression and irritability, irregular action of the heart, flatulence, and cutaneous eruptions of the scaly and impetiginous kinds.   The oxalic diathesis seldom exists long without leading to the substitution of the lithic diathesis.   A phosphatic deposit in the urine is a common enough occurrence, when the fluid has stood some time so as to become ammonical.   It is even far from being rare as a formation at the moment of the discharge of urine, although probably less frequent then, than some, from disregarding the extreme rapidity of decay in certain urines, have been inclined to suppose.   It is most generally in the shape of an impalpable loose powder and not abundant, so that it often does not give rise to any particular local uneasiness,—a circumstance the more likely to occur, that the urine is in such causes not defective, but rather abundant in quantity.   Sometimes, however, the quantity of amorphous phosphate discharged is very great, so that the urine seems like milk from its turbidity and opacity.

In such cases, and also where the earthy phosphates present themselves in the form of palpable grains and calculi, the local symptoms occcasioned are much the same as in the instance of lithic gravel. The constitutional symptoms of phosphatic deposition, whether amorphous or in visible particles, are commonly severe. There is generally great disorder of digestion, more chronic however than in lithic gravel ; the bowels are much disordered by alternating costiveness, and a dark, fetid, sometimes yeasty diarrhœa ; and the excitement of the circulation, instead of being of the phlogistic kind, as in lithic gravel, and connected with plethora, presents the characters rather of exhaustion, debility and irritation,—a small, feeble, often frequent, and irritable pulse, sometimes a tendency to imperfect hectic, with emaciation, debility, a haggard expression, and not unfrequently the general aspect of organic disease. In point of fact, phosphatic deposit and gravel are more frequently organic than functional in their origin ; and when well-marked and of some standing, are generally connected either with calculus in the bladder, or with derangement of structure in the kidneys or other urinary organs, or with organic affection of the rectum, uterus, and other adjacent parts, or with injuries, organic disorders, and severe functional disturbance of the spinal cord. In phosphatic gravel the urine is commonly abundant, paler than natural, and of lower density, often ammoniacal when passed, or at least very soon afterwards, and disposed to become turbid on standing, or to form an iridescent pellicle. This condition of the urine should always be regarded with distrust. It appears, indeed, sometimes to exist temporarily under the influence of depressing emotions of the mind, or exhausting mental application ; in other instances it seems even to occur as a permanent constitutional peculiarity, without either the coexistence of organic disease in the urinary organs or elsewhere, or the supervention of phosphatic deposits in the urine : but more frequently it depends, like phosphatic deposit, upon organic disease, and in general it is not long unaccompanied with that form of urinary deposition. *Cystic gravel*, composed of cystine or cystic-oxide has been so seldom observed that little information is yet possessed of the symptoms with which it is associated. *Dr. Prout*, however, is inclined to the opinion that it is connected with organic disease in the kidney rather than with mere functional derangement ; and consequently the symptoms are probably much the same with those of phosphatic gravel. The urine has hitherto been always observed to possess a greenish-yellow colour and a peculiar odour, and it remains muddy and opalescent after long standing. *Siliceous* gravel, as was hinted above, is of dubious existence, though mentioned by most authors as one of the varieties. Cases of the apparent discharge of siliceous sands with the urine are by no means uncommon. But, with a single exception, those which have been thoroughly investigated have proved to be cases of imposition. Practitioners are generally very averse to admit this interpretation ; but it is right to be aware that the most respectable station of life, and the total absence of all apparent motive, constitute no sufficient security against imposition of the kind being practised, especially by females. The writer was once consulted in three distinct cases within a single fortnight, where the substance said to be passed evidently consisted of comminuted quartz. In one of these, which occurred in the person of a young lady of beauty and accomplishment, and in a respectable sphere of life, her attendant could scarcely be brought to believe in the imposture ; so improbable was it rendered by the circumstances of his patient. The matter, however, which had been passed very often during a period of some months, was clearly comminuted quartz, not always finely broken down ; and on one fragment, which was afterwards examined along with *Dr. Bostock* in London, there were evidently two black specks of adhering chlorite. In a fourth case, which occurred in the infirmary of Edinburgh, the gravelly matter was brickdust, which was used in the ward for scrubbing the floor, and closely resembled lithic gravel. Many similar cases have been recorded by authors. It is right at the same time to add that *Dr. Yelloly* once met with particles of

silica in the interior of a calculus, and that *Dr. Venables* has recorded a case where, to all appearance, siliceous matter was really discharged by the urine. The detection of pretended cases is always easy enough ; the siliceous particles when examined with a common magnifier are seen to be sharp-edged, without any regular form, and with a fresh shining fracture. True siliceous gravel must either show somewhat of a regular crystalline form, or present a dull surface without sharp edges.

The practitioner should never trust to the symptoms now enumerated for distinguishing the several varieties of gravel. Where the gravelly matter can be obtained, its properties must be carefully examined ; and where the other symptoms are present, without his being able to examine the gravel itself, he must in the meantime attend to the condition of the urine. Under the head of the several kinds of deposit which may be formed from the urine, their distinguishing characters have already been stated in detail ; and those of the urine have been just described in relating the symptoms. But it may be right to recapitulate in the present place the whole method of investigation.

The lithic gravel is grayish, reddish, or brownish, insoluble in diluted muriatic acid, and easily soluble in aqua potassæ, commonly with evolution of ammonia. It consists of variable proportions of lithic acid and lithate of ammonia, the former of which generally abounds most in the crystalline, and the latter in the amorphous forms of it. The corresponding urine is scanty, usually high in density and colour, always at first acid to litmus paper, prone to deposit an adherent sand on standing, and often yielding with a few drops of nitric acid a cloud or flaky precipitate, which disappears under a boiling heat, accompanied commonly with a reddish or purplish change of colour. Phosphatic gravel is usually white or pale-gray, and amorphous or crystalline ; and it is insoluble in aqua potassæ, but easily soluble in diluted muriatic or acetic acid. It consists very rarely of phosphate of lime alone, sometimes of the phosphate of magnesia and ammonia, and often of both compounds. If ammonia be evolved under the action of potash it contains the ammoniaco-magnesian phosphate ; if not, it contains only phosphate of lime. The corresponding urine is copious, pale, low in density, ammoniacal from the first or very soon afterwards, prone to decay, and often rendered turbid by boiling, a white flaky precipitate being separated, which is easily soluble on the addition of nitric acid. Oxalic gravel is commonly brown, ash-gray or bluish, compact, occasionally crystalline, sometimes smooth, sometimes tuberculated ; and it is soluble in diluted nitric acid, scarcely soluble in diluted muriatic, insoluble in acetic acid, insoluble in aqua potassæ. The corresponding urine has been little studied. It is clear, probably pale and low in density, and if it contains, as seems not unlikely, a little oxalic acid, it will give with solution of muriate of lime a white precipitate not soluble on the addition of a few drops of muriatic acid. Cystic gravel has a crystalline somewhat waxy appearance, and it is soluble in diluted muriatic acid, insoluble in acetic acid, soluble in solution of carbonate of potash, from which it is precipitated by carbonate of ammonia. The corresponding urine is greenish-yellow, of a peculiar odour, like that of the briar mingled with that of decayed urine, and it remains turbid after some hours' rest.

Causes and Pathology. The pathology of urinary gravel may be conveniently investigated in connexion with a statement of its causes. Gravel has been traced to originate for the most part in particular kinds of diet, or to be connected with organic diseases either in the urinary organs or the organs of digestion ; but it is also clearly connected with constitutional causes, sometimes obscure in their nature ; and it is promoted by the sources of suppressed transpiration, and by certain circumstances connected with the period of life, being more frequent in infancy than in youth, and most frequent of all after the age of forty, as well as in old age.

By far the most common cause of gravel is the mode of living in respect of food and drink. It is not improbable that a certain constitutional tendency

must generally concur before any particular mode of living will prove effectual. But there can be no question that such constitutional tendencies are often inoperative, except under the conjunction of erroneous diet; and there is a probability that erroneous diet may in some cases prove singly adequate to induce disease. Now from what was stated above, in speaking of the varieties observed in healthy urine, it appears that the kind of urine which is found to be associated with the most frequent variety of gravel, is that which is formed under a diet comparatively dry, superabundant in nutritive principles, and absolutely or disproportionately abounding in azotiferous or animal principles; in short, rich, nutritive, solid, and in excess. Such diet may be long followed by many without leading to such superabundance of solids in the urine as will engender disease, provided it be conjoined with vigorous exercise, and not with other excesses. But when associated with indolence and general luxurious living the lithate of ammonia is apt to become excessive in quantity; in particular constitutions the same evil ensues without any co-operating circumstance in the mode of life; and thus are formed a large proportion of the ordinary cases of gravel, which are met with chiefly among people in the middle station of society, overfed, and sparing in exercise. A thousand interesting facts place beyond all doubt the influence of good living and azotiferous food in augmenting, as well as that of moderation and unazotized aliment in lessening, the tendency to lithic gravel and the lithic diathesis. Comparative physiology and the accurate experimental researches of *Magendie* and of *Krimer* show that unazotized food dilutes the urine, and removes from it much of its lithic acid, while azotiferous food, on the contrary, produces concentration with superabundant secretion of lithic acid; and daily experience illustrates the application of these fundamental facts, both in accounting for the origin or maintenance of gravel complaints, and in effecting their removal.

It is not general full living alone, however, which constitutes a diet favourable to the developement of gravel. Particular articles of food and drink are often as much in fault, nay even more so, than either excess in quantity or in nutritive quality. These are chiefly articles that cause indigestion, or which are hard of digestion, or overabounding in azote, or acescent; to which may also be added calcareous waters. A tendency to indigestion is common among people liable to gravel. In such persons, it is notorious that their urinary ailments are invariably aggravated, or their fits of suffering apt to be brought on, by any thing which occasions a dyspeptic attack, especially if accompanied with acidity of stomach. The reason is, that if acid be secreted in undue quantity in the stomach, it is excreted in undue proportion with the urine, and the lithate of ammonia is in consequence decomposed, so that lithic acid is precipitated. Substances difficult of digestion would even seem to favour gravel, though positive indigestion be not excited by them. In this way, for example, some have plausibly explained the frequency of calculous disorders in certain English counties, such as Norfolk; where the working classes are in the practice of living much on rich heavy puddings, hard of digestion. The influence of highly azotiferous aliment is easily understood, since the excess of azote derived from them must be thrown off by the urine in the form of lithic acid. Accordingly, even in a state of health, there is no article which increases so much the density of the urine, and the deposits formed from it on cooling, as cheese; and to most persons who are subject to gravel, it is found to be injurious,—towards which result its indigestibility may also contribute not a little. Acids and acescent articles of food and drink, especially perhaps the acescent wines, are also very apt to aggravate the sufferings of those affected with gravel; and their habitual use seems even adequate to engender the disease. Their mode of operation is well ascertained; either by their own acidity, or by engendering acidity in the stomach and the over-secretion of muriatic acid there, they tend to increase the acidity of the urine. The effect of the habitual use of water, abounding in calcareous salts, has been very long an admitted

fact in the etiology of gravel. The old belief in the influence of this cause seems warranted by the increased suffering which these waters occasion where a calculous tendency pre-exists, and by the comparative frequency of the disease in districts where they are prevalently used for drink and culinary purposes.

The operation of errors in diet has been hitherto chiefly traced in its relations to the lithic variety of gravel. The dietetic causes of the other rarer forms, if any such causes do exist in their instance, are at present little understood. All positively known on the subject are the facts that, where a tendency prevails to phosphatic gravel, this is aggravated by indigestion, howsoever induced; and that oxalic gravel, or calculus, may be occasioned by the habitual use of sorrel and other vegetables that contain oxalic acid.

Gravel has been clearly produced in some instances by injuries of the spine, such as blows upon the loins or severe falls, producing concussion in that quarter. *Dr. Prout*, who adverts particularly to this cause, has added that, in his experience, the kind of sediment produced is invariably the amorphous form of the phosphates.

Another exciting cause of gravel, which has been satisfactorily ascertained, is the existence of organic diseases in the urinary organs or in the organs of digestion. It would appear that almost any source of irritation in the kidneys, depending upon organic disease, may occasion sedimentary discharges with the urine, and consequently prove the source of calculous complaints. Even chronic organic affections of the bladder not unfrequently, and occasionally too diseases of the urethra, have the same effect. An analogous cause, far from uncommon, is hæmorrhoids, especially when internal; the existence of which is even sometimes apt to be overlooked, on account of the urgency of the gravelly symptoms. The statement of *Dr. Prout*, that gravel occurs not unfrequently in connexion with organic diseases of the liver, is consistent with general observation. But it is not every organic disease of that organ which presents such relations; nor has any attempt been hitherto made to determine precisely where the connexion subsists. Organic diseases of the heart are often attended with excessive deposition from the urine, and not unfrequently with discharge of gravel; the symptoms of which obscure those of the primary and more formidable disease.

The variety of gravel which occurs in connexion with organic disease in the liver or heart, is the lithic, with its modifications, the red and the purplish gravel. But where the calculous secretion is connected with organic disease in the kidneys or bladder, and also in most of the cases where it concurs with hæmorrhoids, the matter discharged is chiefly composed of the earthy phosphates, and in particular of the phosphate of magnesia and ammonia. It is worthy of remark, that in all circumstances where the kidneys or bladder are subject to direct irritation, either from mechanical causes, such as the presence of a fixed calculus, or from chronic organic disease in their own textures, the calculous matter secreted in consequence of that irritation much more frequently consists of the earthy phosphates than of any other substances.

Among the exciting causes of gravel, a good deal of influence has been allowed by some authors to the sources of suppressed perspiration, more especially exposure to frequent cold, in conjunction with defective exercise. Probably, the continual diminution of the cutaneous exhalation from habitual exposure to cold may have the effect even of engendering a tendency to the disease; and there can be no doubt that unwonted sudden exposure is apt to induce an attack where the tendency has been already formed by other causes. A fit of gravel, for example, is often occasioned in those liable to it by getting wet while overheated, by exposure to chill night air, or by sitting on a cold stone. The effect of rough jolting exercise in exciting the symptoms of gravel is peculiar and intelligible. This cause cannot excite the disease; but where concretions are formed in the kidneys, it produces irritation there by displacing them. Hence few calculous patients can bear horse exercise.

The relations of general exercise to gravel are somewhat complex.   Defective exercise, by diminishing the cutaneous transpiration, as well as by increasing the excrementitial part of the food through a diminished demand on the part of the system generally, greatly tends to favour and aggravate gravel.   On the contrary, deposits from the urine are often removed by additional exercise increasing the demand, and improving the cutaneous transpiration,—a result which is particularly manifested in the persons of those who live high and indo-lently.   In those disposed to gravelly deposition, however, it is advisable to avoid much exercise soon after meals ; for the effect at this particular period seems to be rather to increase than diminish the deposit.

The dietetic and other causes now mentioned, efficacious as they often prove in their operation, nevertheless do not often give rise to an outbreak of the dis-ease, unless under the co-operation of certain predisposing circumstances. Occasionally, indeed, cases will seem to arise under full, luxurious, intemperate living, where no predisposition can be traced.   But on considering how vast a number of people in the middle station of society live in that manner to an advanced age, without showing any tendency to gravel, some reason will appear for doubting whether a predisposition may not be indispensable in all instances. In not a few individuals it would appear that nothing further is required to excite gravel than strong constitutional tendency ; that is, the constitutional tendency may be so powerful as to lead to the formation of the disease under regular, moderate, or even abstemious living, as well as the avoidance of all other known causes exciting as well as predisposing.   The writer has at present a lady under his care, who, though she lives most abstemiously and in a great measure on vegetable food, and is exposed to none of the other causes of gravel, has for many months been constantly tormented with gravelish complaints, and con-stantly passes urine of high density, and overloaded with free lithic acid.   Such cases, however, are fortunately rare.   It is consolatory to the patient and his physician to reflect, that a great proportion of cases arise under a superfluity of nourishment, aided by constitutional liability.

The physical characters of the calculous constitution are not clearly known ; but it is often to be recognised by proneness to other diseases, or by their actual existence.   No fact is better established on this head, than that gravel is an hereditary complaint.   Its connexion with gout is also clearly ascertained. Sometimes that disease is actually preceded by a fit of gravel.   Full living, with hereditary tendency, is the most frequent and manifest cause of both disor-ders ; both are often conjoined in the same individual ; and gout is well known to lead to the secretion of lithic acid in other parts of the body besides from the kidneys.   A liability to cutaneous diseases, especially of the scaly kind, has been found by *Sir Gilbert Blane* and *Dr. Prout* to be another constitutional morbid state in which gravel is apt to be formed.   Age has obviously an impor-tant influence.   The lithic variety is frequent in the early years of childhood, and again after the age of forty, but especially about the age of fifty and sixty ; but between puberty and middle age it is comparatively rare.   It does not exactly appear why infancy should predispose to lithic gravel.   The influence of advancing life however is easily understood : the predisposition begins to manifest itself at that period when luxurious habits are in general fully formed, and when habits of indolence also usually begin to creep on.   The oxalic dia-thesis occurs at times in infancy, most frequently between puberty and fifty years of age, very rarely in old age.   The disease is much more frequent among males than females, simply because the former far more frequently com-mit habitual excesses at the table.   For the like reason it is more common among the middle ranks than in the working classes.   It is more frequent too in sedentary than in active professions ; because in the latter there is a greater demand for the surplus aliment habitually taken, which in the former must be more largely discharged as excrementitial matter.

Prognosis. The prognosis in cases of gravel may be deduced in a great measure from the foregoing facts and principles.

Important information may be drawn from the species of gravel discharged. The least unfavourable species is the lithic gravel, because it is not only the easiest to remedy, but is also least frequently associated with organic diseases. On the contrary, the phosphatic gravel is commonly an unfavourable variety. If temporary, as when connected with fear, anxiety, or nervousness, it is of little moment, except as showing the existence of a predisposition which ought to be watched. But when permanent it is decidedly unfavourable, being then often associated with organic affections of the kidneys, bladder, or other viscera. The most unfavourable of all is that which is composèd chiefly or wholly of phosphate of lime. This rarely occurs without organic disease in the mucous membrane of the kidneys or bladder ; which indeed is in general further proved by the coexistence of mucus in the urine. Pink-coloured sediments are unfavourable, being commonly associated with organic disease. The oxalic gravel is troublesome to remove, and apt to occasion more torture to the patient than other forms ; but it has not been found, like the phosphatic, to have a connexion with organic disease. Those cases are generally the most urgent in their symptoms and most difficult to remedy, where the concretions discharged are of some magnitude, obviously because, besides the secretion of calculous matter, there is a risk of fixed calculi existing in the kidneys, or forming in the bladder.

Accurate deductions may also be formed as to the result, from the circumstances in which the disease originates. It is unnecessary to specify these particularly, as they may be at once perceived on referring to what was said above under the head of *Causes*. It may be sufficient to mention here, that among the ordinary run of cases those are most unfavourable where a disposition to the disease has been strongly manifested by hereditary right, and in absence of the chief known exciting causes, namely, free living and sedentary habits.

Lastly, the prognosis may be safely regulated by the influence of treatment. If judicious treatment speedily alters the characters of the urine from those which are known to favour calculous deposition, a favourable augury may be formed ; and if the symptoms at the same time subside, the patient may for the most part be assured that his health and comfort are at his own command. If, on the contrary, the gravelly deposits and the morbid characters of the urine resist judicious treatment, the prognosis is unfavourable ; frequent fits of gravel may be anticipated, and there is great risk of renal or vesical calculus.

Treatment. The treatment of gravel is now well understood ; for which medicine has chiefly to thank the pathological discoveries of the medical chemist. It differs with the several species.

In lithic gravel the object of the treatment is to increase the quantity of urine, to lessen its density and surcharge of azotiferous principles, and for a time to substitute an alkaline condition for its usual acidity ; to which may also be added the maintenance of the cutaneous secretion. The requisite changes in the condition of the urine are to be attained, first, by diminishing the quantity and nutritive quality of the food ; secondly, by increasing the drink and withdrawing acescent liquids ; thirdly, by the administration of alkaline antacids ; and, lastly, by enjoining regular exercise. In many cases it may be necessary to remove dyspeptic symptoms, to correct excitement of the circulation or unusual irritability, or to enforce the avoidance of particular kinds of excercise. And in all circumstances an important accessary in the treatment is protection against irregularities of temperature, by warm clothing and a general diaphoretic regimen.

The most essential article of the treatment is the due regulation of the diet. Many cases of gravel are thus entirely remedied, and never sustain a relapse, except under occasional dietetic aberrations ; while, without such measures, few cases of lithic gravel get permanently well through any other means. Where

the disease has arisen under considerable excesses of the table, such as the unrestrained indulgence of the appetite, especially in rich azotiferous articles of food, a moderate reduction is often all that is necessary for effecting a thorough cure. Accordingly, in such circumstances, some get quite well on abandoning the practice of eating meat at breakfast, or by giving up altogether the meals of supper and luncheon. In general, however, more serious reductions are required; and sometimes it is advisable, for a time at least, to bring down the quality of the diet gradually, till it consists chiefly of vegetables and milk. Where the disease forms under ordinary moderate living as practised in the better ranks, and where of course a strong predisposition must prevail, the patient will seldom enjoy long freedom from this tormentor, unless he follow permanently a diet composed in a great measure of milk and vegetable food. The effect of this treatment has been well exemplified by the observations of *Magendie* on the subject in his work on gravel, as well as by his experiments, and those subsequently made by *Krimer*, on the influence of a purely vegetable diet in increasing the amount of urine, lowering its density, and diminishing its proportion of lithic acid. The rigorous system required in some aggravated cases by the principles advocated by the French physiologist, has been opposed by some as incapable of being enforced on the luxurious weak-minded epicure. But they forget that extreme measures are needed only in extreme cases, where the torture sustained by the patient is a powerful auxiliary to the physician in carrying his measures into effect. It is probable that few cases of lithic gravel will resist the dietetic mode of cure if pushed far enough, provided there be no contraindication, such as either a worn-out constitution or the concurrence of dyspepsia, the latter of which in particular often renders the regulation of the diet extremely difficult. *Magendie* mentions the case of a provincial magistrate long and cruelly afflicted with gravel under an abandonment to the pleasures of the table, who found it necessary for some weeks to restrict his diet to articles entirely vegetable, namely, tea, almond-emulsion, sugar-water, legumes, fruit, rice, and gruel, and who in six weeks got quit entirely of the gravelly deposit in his urine, together with all its accompanying torments. Certain articles of food should be carefully shunned, as being always found injurious in gravel. These are chiefly acescent substances, cheese, pastry, dumplings, rich puddings, unfermented bread, and generally all substances hard of digestion.

Among other beneficial effects of a diet more vegetable in nature than usual, an increase in the quantity of the urine is an important result. This object, however, must be further secured by augmenting the quantity of the drink. The drink should consist of the more simple diluents. Spirituous liquors are commonly hurtful; wines are also generally injurious, especially the wines of France and Germany; and where it is necessary to allow the moderate use of wine, cherry is usually found to answer best. Acids for the most part are hurtful. Even the citric and tartaric acids are injurious by their action on the stomach, although some chemical physicians are inclined to allow them, because they are known to be decomposed, and to pass by the urine in union with alkalis and converted into carbonic acid. Drinks acidulated by carbonic acid are not detrimental; and hence strong malt liquors, especially table-beer strongly hopped and used in moderation, may be generally allowed with safety.

As the urine in lithic gravel possesses an acid reaction, while lithic acid is easily soluble in alkalis, and these taken internally pass off readily by the kidneys, the administration of alkaline remedies constitutes a rational and in reality an effectual method of cure. In certain circumstances too they fulfil a collateral object of no little moment, by correcting acidity of the stomach in dyspeptic cases. The utility of alkalis was first suggested by the success obtained from Stephen's nostrum for stone and gravel, the essential ingredients of which were lime and soda in the form of soap. It has been since found that the fixed alkalis, either in the caustic state or in that of carbonate or bicar-

bonate, answer equally well, if not better; and now the most approved method is to administer the bicarbonate of soda* or potash, in the dose of ten or twenty grains twice or thrice a day in any convenient vehicle. An objection has been brought against the continued use of alkalis, that they tend to debilitate the stomach, and likewise to induce the substitution of phosphatic for the lithic deposit in the urine. The former inconvenience, however, is only occasioned by their abuse, and is probably more frequent where the caustic alkalis or their carbonates are used instead of their bicarbonates. The latter objection to the use of alkalis has been for some time an article of general belief in medical practice. It has been thought that the alkaline condition of the urine, induced by their administration, must have the same effect with the ammoniacal state of the urine induced by natural causes, in favouring the developement of phosphatic deposition; and cases of the apparent exchange of the lithic for the phosphatic diathesis have been mentioned by various authors. The influence of alkalis in this respect, however, has been overrated. The objection at all events would seem to apply to the caustic alkalis and their carbonates only. Their bicarbonates, much diluted, do not tend to excite the phosphatic diathesis: at all events they will speedily be seen to be even applicable, with certain precautions, to the treatment of the phosphatic as well as the lithic species of gravel. *Dr. Willis* mentions, that he has known the practice of taking alkalis internally kept up throughout a long life, without any apparent injury to the health; and the writer has known it maintained for twenty years. The alkaline bicarbonates are preferable to lime-water or magnesia, which are used by some as antacids in gravel. The best of all their forms is that of some alkaline aërated water, such as Vichy, St. Nectaire, Vals, Carlsbad, Bilin Tarasp. The waters of Vichy have long been justly celebrated for their efficacy in the treatment of gravelly complaints. In this country soda-water or kali-water with about a scruple of carbonate *per* bottle, may be usefully substituted. Like alkaline mineral waters, it has no tendency to substitute the phosphatic for the lithic deposit.

The last important article of the general treatment is regular, active exercise. The influence of defective exercise in favouring the developement of gravel in predisposed constitutions, has been so much dwelt upon in the preceding pages, that it is unnecessary to add much on the subject in the present place. It is serviceable, notwithstanding that it tends to diminish the volume of the urine,— on the one hand, because it increases the cutaneous transpiration, and on the other because it diminishes the proportion of excrementitial discharge from the food, by occasioning a greater demand for it in the form of nutriment.

Incidental circumstances often establish a necessity for accessary or incidental treatment. In the early stage of the disease in plethoric robust habits, or under very unusual indulgence at table, the circulation is frequently in a state of excitement, and the kidneys in a state of irritation, which may with advantage be met, in the first instance, by general or local blood-letting. The torture occasioned by exercise, more especially of the active kind, or which agitates the body considerably, may render it indispensable to avoid every thing but gentle exercise, particularly walking; and at times absolute rest may be required for a period until the other articles of the treatment shall in some measure take effect. But, above all, very material modifications may be called for in the dietetic treatment already laid down, where the patient, as often happens, is subject to dyspepsia. In such cases it is difficult sometimes to regulate the food and drink properly. The dyspeptic symptoms may indeed be nothing else than the consequence of repletion, and are then removed along with the urinary disturbances by more or less abstemiousness. But in many cases, particularly in elderly patients, the functions of the stomach are decidedly

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* In the London Pharmacopœia of 1836, termed *Sesqui*-carbonate of soda; which, however, the article of the shops seldom is, and never ought to be.

enfeebled; indigestion, even under regular living, is a frequent occurrence, always to the serious aggravation of the renal complaints; and it is found impossible to enforce a rigorous vegetable diet, though that may be otherwise called for by the condition of the urine and the nature of the sediment.   Here the ordinary treatment of dyspepsia is to be put in practice.   A distinction must be drawn between the cases where the disorder is owing to simple irritability of the stomach, and those where defective or faulty chymification is its cause; for both forms of dyspepsia may concur with gravel.   The former may be treated with local blood-letting or counter-stimulants, white bismuth, hydrocyanic acid, and other calmatives; the latter by bitters, chalybeates, and a diet chiefly animal, but sparing in quantity.   In both forms the alkaline bicarbonates are habitually given, and serve an obvious double purpose.   In both cases, too, gentle mercurials are often signally serviceable, directly for the improvement of digestion, and indirectly for restoring the healthy condition of the urine.   Nay, even where the stomach is not affected, the administration of the blue pill every other evening, in conjunction with resinous laxatives, is sometimes of great use in correcting the morbid state of the urine.   It scarcely needs mention, that, in all circumstances, constant attention must be paid to insure the regularity of the alvine evacuations.   This is generally best accomplished either by the combination already mentioned, or by the neutral salts, which possess the advantage of increasing the secretion from the kidneys.

The injurious effects of irregularities of temperature must be always carefully guarded against.   It is unnecessary to mention the specialties of regimen by which this object is to be secured.   Warm clothing, and the ordinary precautions against accidental chills, are of imperative consequence; and much advantage has been found in the regular use of the warm-bath, and in its occasional employment where the gravelly symptoms have been aggravated by exposure to cold or wet.

At one time much importance was attached to the administration of remedies for promoting the lithic discharge, under the supposition that the symptoms were occasioned by the suppression of the habitual deposit from the urine, and that nothing was of more service than " to bring away the gravel."   This practice was carried to an injurious extent, thereby increasing the evil it was intended to diminish.   Yet it is well known that, at a certain time of life, and in certain constitutions, namely, in gouty habits between the ages of forty and sixty, a long course of suffering from dyspeptic and urinary ailments is sometimes terminated by a copious discharge of gravelly sediment.   It is rational practice, therefore, to endeavour to promote this discharge in such circumstances.   Accordingly turpentine, cantharides, and other stimulants of the kidneys have been used with evident effect in bringing away gravel, and in relieving the patient's sufferings.   Such practice, however, must be adopted with caution, and never persevered in unless upon sure grounds.

So much for the treatment in lithic gravel, the most common of all its forms. In the phosphatic species, measures somewhat different are required.   A low, or vegetable diet is not indicated either by the constitutional derangement or by the condition of the urine.   The urine is not defective in quantity or overloaded with azotiferous principles; and the constitution is enfeebled by long-existing chronic disease.   Accordingly a diet rather generous, consisting of nutritive digestible articles of food, and admitting even of the moderate use of wine or other stimulants, is found the most appropriate.   A process of reasoning, somewhat analogous to that which constitutes the foundation of the alkaline treatment of lithic gravel, led to the treatment of the phosphatic species by acids : As the urine, which is acid in the former, has its properties corrected by alkalis, so it was inferred that acids would correct the alkalinity of the urine which usually prevails in the latter.   The analogy, however, has not been found to hold good; for the administration of acids in cases of phosphatic gravel is not found generally to neutralize the alkaline state of the urine, and still less to render it acid

in its reaction. Nevertheless, the administration of the acids, such as nitric and muriatic acid, is undoubtedly often of service in diminishing the deposit in the urine; which effect must, therefore, be ascribed to their action as general tonics in improving digestion and invigorating the constitution. It is generally maintained that the use of acids has a tendency to alter the diathesis, and lead to the exchange of the lithic for the phosphatic deposition. This is a much more rare occurrence than it was at one time, upon theoretical grounds, supposed to be; but still it appears sometimes to happen where acids have the effect of neutralizing alkaline urine. Following out the analogy alluded to, physicians further inferred that, in phosphatic gravel, alkaline remedies must prove injurious; and this conclusion is in some measure correct, since the caustic alkalis and their carbonates certainly seem rather to aggravate the disease. But it was afterwards proved by *D'Arcet* that, if the alkalis be taken in the form of acidulous bicarbonates largely diluted, for example, in that of a natural alkaline water, such as the mineral water of Vichy, they will correct the phosphatic diathesis, remove phosphatic deposits, and greatly relieve the patient's sufferings, being, in fact, scarcely less serviceable here than in cases of lithic gravel. (*Annales de Chim. et de Phys.*, xxxi. 301.) His observations have been confirmed by the ulterior researches of *Petit* and *Chevallier*, on the effects of the water of Vichy in dissolving phosphatic as well as lithic calculi, which will be mentioned presently. The state of the bowels should never be neglected; and, in general, the most useful laxatives are the neutral salts, because they tend to increase the quantity of the urine. The addition of a little blue pill or calomel to any of the common resinous laxative pills has also been found to constitute a useful purgative; but mercurialisation must be avoided. The treatment of incidental and accessary disorders must be carefully attended to in this as in all other varieties of gravel; more especially must attention be paid to the organic diseases with which it often concurs, and of which it is generally a mere symptom. Attacks of acute or protracted pain must be combated by calmatives and anodynes. In severe phosphatic gravel the regular use of opium or other anodynes is commonly required, not merely on account of pain, but likewise to mitigate irritability, anxiety, and restlessness. Tonics, too, are commonly called for, such as uva-ursi, pareira-root, and other tonic bitters and astringents.

The treatment in oxalic gravel does not differ essentially from that laid down for lithic gravel, except in so far as abstemiousness, or a vegetable diet, is not so peculiarly called for. An antiphlogistic regimen, however, is often necessary at the outset; but afterwards moderate living, regular exercise, and the use of the alkaline carbonates, with warm clothing and occasional warm baths, constitute the chief articles of the treatment. All articles of food which contain oxalic acid ought to be carefully avoided, more especially sorrel and wood-sorrel; but indeed acids generally are to be shunned as more or less injurious. *Dr. Prout* has suggested, that advantage may be found in trying to convert the oxalic into the lithic diathesis. It was remarked above, that this conversion always takes place sooner or later in the course of the disease by the efforts of nature. *Dr. Prout* puts the question, whether it is not advisable to produce this change artificially, which he found to be accomplished by means of muriatic acid; for in this way a known disease, amenable to treatment, is substituted for one which is obscure, and whose treatment is little understood. He adds that, on applying these ideas to practice, he has found immediate relief follow a copious discharge of lithic sediment.

The treatment of other forms of urinary gravel is necessarily little understood, as they are of rare occurrence; and their relations to remedies have been seldom made the subject of careful inquiry.

URINARY CALCULUS.

WHEN gravelly concretions attain such a size as to remain for a length of time or permanently in the kidneys, bladder, or urinary passages, the disease is named *Calculus.* The passage from gravel to calculus is gradual or imperceptible, and the one is frequently united with the other. They are closely allied in all their relations. They originate in the same causes and circumstances; they are composed of the same ingredients; they are indicated by similar symptoms. It is chiefly in the treatment that any material difference is presented. Even here there is in some measure an identity between them; which indeed only ceases when the surgical art is called in to the aid of the physician.

As in the present state of therapeutic knowledge urinary calculus is seldom successfully treated without the art of surgery being called into requisition, the whole subject has been usually considered as belonging rather to the domain of surgery than of physic. A full exposition of it would be therefore out of place in this work. A condensed view of the general subject, with a more detailed statement of its strict relations to medical practice, is all that seems necessary.

Symptoms. When a calculus is impacted in the kidney, it may not for a long time give rise to any uneasiness; but when it manifests itself by symptoms, they are almost the same with the sufferings occasioned by urinary gravel. There are frequent pains in the loins, extending towards the groin or testicle, or point of the penis, retraction of the testicle, nausea and vomiting, painful and frequent micturition, often bloody, and often too attended with the discharge of sand or larger stony concretions. The peculiarities are, that jolting exercise is more apt to occasion acute pain in the region of the kidneys; that rest gives more relief to suffering; that after the morbid condition of the urine has been corrected by diet or otherwise, and gravelly deposits cease to be discharged, lumbar pains, hæmaturia, and other local annoyances continue to recur, especially when the body is subjected to sudden shocks of agitation; and that a fit of unusually severe pain, sickness, and dysuria is often followed by the discharge of a little calculus, and long or even permanent relief from suffering. In unfavourable cases other symptoms are superadded, indicating the occurrence of secondary disorders of the kidney, among which the most important are abscess, atrophy, and dilatation. The obstruction occasioned to the escape of urine may induce dilatation to such a degree as to expand the kidney into a membranous bag, which may even attain so great a size as to be felt in the abdomen. More frequently the constant irritation of the stone leads, on the one hand, to atrophy of the kidney, which is not marked, however, by any characteristic symptoms; and, on the other, to chronic inflammation, suppuration, and abscess, indicated by constant lumbar pain, irritability of the bladder, irregular fever gradually passing into hectic, together with the discharge of pus with the urine, and coagulability of that fluid by heat and nitric acid. In some rare cases, abscess thus arising has made its way outwardly at the loins. The symptoms of the arrestment of a calculus in the ureter are intense acute pain somewhere between the region of the kidney and that of the bladder, stretching along the course of the urinary passages to the point of the penis, the testicle, or the inside of the thighs, and often attended with great tenderness on a circumscribed spot of the abdomen, corresponding with the seat of the impacted calculus; constant and often ineffectual calls to pass urine, which, after a time, passes tinged with blood, or mixed with clots; severe nausea and vomiting; and

extreme anxiety and agony. These symptoms generally cease on a sudden; and then it is not uncommon to find a calculus discharged ere long by the urethra, or a large quantity of gravelly particles and sand. The calculus is sometimes permanently retained in the ureter; in which case the acute symptoms, if ever present, pass off, and symptoms of organic disease in the kidneys arise. Various organic diseases may probably be thus occasioned; but most generally the obstruction causes distension of the upper part of the ureter, distension of the kidney, and atrophy of its glandular structure. When a calculus is lodged in the bladder the symptoms are somewhat different. Occasionally it may remain for a great length of time, and increase to a large size without giving any uneasiness. In many other cases it occasions for a period only frequent micturition, ill-defined uneasiness at the neck of the bladder, and a sense of weight, pressure, or slight pain there immediately after the urine is evacuated. Its characteristic effects are frequent calls to make water; a sense of weight in the lower pelvis, and especially at the neck of the bladder; sudden pain there excited by exercise, especially of a kind which jolts the body; discharge of blood, particularly after such exercise; sudden arrestment of the flow of urine, with immediate ineffectual efforts and pain. As the disease advances the micturition becomes more and more frequent and painful, the pain which succeeds every discharge is more prolonged, a dribbling of urine follows, blood also often flows after the urine, and mucus streaked with blood begins to pass likewise; gravelly sand escapes in increased quantity, which after a time consists chiefly of earthy phosphates; and there is a constant itching and pain of the glans penis, which, in children particularly, leads to frequent squeezing and pulling, and consequent elongation of the prepuce. In this, the advanced stage of the disease, there is also marked constitutional disturbance; defective appetite and digestion, disturbed sleep, feverishness and a tendency to irregular hectic: debility, incapacity of mental or bodily exertion, emaciation, and a haggard expression of the countenance. Under such symptoms the patient, unless relieved by removal of the stone, at length dies exhausted with constant excessive torture and increasing irritative fever. The immediate cause of death is most generally inflammation of the mucous membrane of the bladder. When the symptoms are so well marked as those just detailed, there can be little doubt of the existence of a calculus in the bladder. For complete satisfaction in such cases however, and of course still more where the disease, being in its early stage, is more obscurely indicated, it is necessary to have recourse to the operation of sounding the bladder. This should be done when the patient has been for some time quiet and free of suffering. Its correct execution depends on a species of skill which the physician cannot be expected to acquire; so that in the present sketch the manner of performing it need not be described. Sometimes a small calculus, which has escaped from the ureter into the bladder becomes impacted in the urethra, in consequence of being too large to pass along its canal. This accident is indicated by a sense of obstruction and stinging pain in the part, great difficulty in passing urine, which either comes away in drops, or more frequently is retained altogether, and best of all by careful examination with the sound or catheter.

Urinary calculi vary much in size and form. Renal calculi are generally of a small size, often no bigger than a pin's head, and seldom larger than a pea; and they are most commonly found in the uriniferous tubes, where they converge to form the mammillæ. From the points of the mammillæ they sometimes project into the infundibula; and occasionally they fill and distend the whole pelvis, and ramify into the infundibula, in which case they may attain a large size, calculi of this kind being at times found as big as a tennis-ball, and of the weight of two or three ounces. In the bladder they often attain an enormous magnitude. Calculi weighing twelve ounces have been extracted during life, and one has been found in the bladder after death which weighed forty-four ounces. They commonly assume a flattened oval form, sometimes present a contraction in the

middle like an hour-glass, and where several exist in the bladder at one time, they tend to assume the cubic or trapezoidal shape. Their surface is sometimes uniform and smooth, sometimes uniform but rough and semi-crystalline, often somewhat like the roe of a fish, and occasionally rugged and botryoidal, in which case they commonly consist of oxalate of lime.

Composition. Calculi, whatsoever their size, and wherever lodged, are essentially composed of the same ingredients with urinary gravel. They are sometimes formed on a nucleus of foreign matter, which may be either derived from within the body, such as a mass of fibrin or clot of blood, or introduced from without, such as a broken fragment of a catheter, a portion of a bodkin, a bit of bone, a tooth, a pebble, and the like. More generally the nucleus is itself a small calculus, which commonly consists of lithate of ammonia, sometimes of oxalate of lime, rarely of any other substance. Around the nucleus as a centre calculous matter is arranged in concentric rings, sometimes loosely aggregated, more commonly dense, hard and compact. The innermost layers are for the most part composed of lithate of ammonia; and in a great proportion of cases either of this substance, or of oxalate of lime. Often there is no other material deposited but one or other of these compounds; which therefore constitutes the entire mass of the calculus. Occasionally the lithate and oxalate form alternate layers. It is seldom, however, that a calculus attains a considerable size without presenting the earthy phosphates as the chief constituents of its outer part. In conformity with the general law, that irritation from mechanical or organic causes cannot long subsist in the urinary organs without occasioning the developement of the phosphatic diathesis in the urine, it is found that all calculi, whatsoever their composition in the first instance, sooner or later proceed to grow by the deposition of phosphate of lime and phosphate of magnesia and ammonia on their surface. The last-mentioned substance is sometimes beautifully crystallized, an appearance which is particularly observed in calculi that have attained a considerable size in the kidney. Phosphate of lime is not so frequent or abundant as the ammoniaco-magnesian phosphate; and it very rarely constitutes the sole ingredient of a calculus. Where it constitutes the chief or sole ingredient, the kidneys are affected for the most part with irreparable organic disease. It is held by some that when the phosphatic diathesis of the urine has been once constituted, and phosphatic layers have once been formed on a calculus, its constitution no longer undergoes any change; but that all its subsequent growth is phosphatic in composition. Such is the general rule. Yet there are some exceptions: the varying composition of the successive rings of large calculi clearly shows that after the phosphates have for some time been deposited, the diathesis of the urine may undergo a change, and the lithate of ammonia be formed for a considerable length of time. The cystic oxide is rarely found in calculi; and when met with, it constitutes almost the entire concretion, which has a grayish colour, and uniform crystalline structure. In some rare cases the layers of stony matter have been observed to alternate with strata of a soft animal matter like fibrin or coagulated albumen. An extremely rare variety of vesical calculus, consists only of lithate of soda. A very rare form of calculus, which has not yet been found in sedimentary deposits, is that called xanthic oxide, from its yellowish-red colour. It has only been met with once, and is therefore of little interest. It is best known by the effects of nitric acid, which dissolves it, and forms a solution, which leaves a yellow residuum on being evaporated; and this forms with water a solution which becomes colourless with acids, and carmine-red with aqua potassæ.—In every case there is a considerable quantity of animal matter intermingled with the proper calculous material, the particles of which it unites and firmly binds together.

Treatment. For at least a century past the treatment of urinary calculi has been a subject of intense interest; the most eminent names in surgery and physic are associated with the inquiry; but the advancement that has hitherto

been made, is scarcely conformable with the amount of scientific research and practical experience which have been brought to bear upon it. Valuable information nevertheless has been acquired already ; and it is the opinion of some that important discoveries may be anticipated, by which this branch of therapeutics will be eventually removed from the low position which it still occupies.

Calculus in the kidney to be treated precisely as directed for gravel. The alkaline bicarbonates, much diluted, and surcharged with carbonic acid, should be given regularly ; the quantity of urine may be further increased advantageously by diuretics ; the warm bath is serviceable for putting an end to severe fits of suffering ; the diet must be carefully regulated as directed before ; the occasional removal of blood from the loins by leeches or cupping is also advisable ; and even counter-irritation by setons and issues may be sometimes proper, in order to avert or remove chronic inflammation and abscess.

The arrestment of a calculus in its passage down the ureter may be advantageously treated by the warm bath, opium, and blood-letting where the constitution will admit of it.

Calculus in the bladder is in the present day most generally viewed as a disease which can be fundamentally removed only by surgical aid; and two methods are familiarly followed, that by excision, or lithotomy, and the method by crushing or grinding the stone in the bladder, which is called lithotripsy and lithotrity. In all cases, however, much may be done to retard the progress of urinary calculus, and relieve the patient's sufferings by treatment strictly medical ; and the sentiments of some high authorities, both in physic and surgery, tend to the doctrine, that the efficacy of medical treatment, in accomplishing even a thorough and radical cure, has been in the present day underrated. The facts and arguments to this purport have been well brought together by *Dr. Willis*, whose work may be advantageously consulted for a detailed exposition of the principles on which the modern treatment of calculus in the bladder is founded, as well as much valuable literary and practical illustration.

The treatment of vesical calculus, as far as regards the correction of the diathesis under which it has arisen, the arrestment of its further growth, and the mitigation of suffering, is quite the same with that laid down above for urinary gravel. But for some time past medicine has proposed for itself a higher problem, namely, the destruction of the calculus in the bladder by means of remedies of the nature of solvents. The history of this department of therapeutics is not without interest. In 1743 the British parliament purchased from a Mrs. Stephens the secret of a nostrum then in great repute, by which it was alleged that stone could be dissolved in the bladder, and of which the active ingredients were found to be calcined egg-shells and soap, that is substantially lime and soda. It was afterwards inferred, still without any precise knowledge of the nature of the urinary calculi, that the alkalis and alkaline earths in general, both pure and carbonated, would prove equally efficacious ; and the inference seemed to be justified by actual trial. Subsequently it was recollected that the French surgeon *Littre* had, towards the commencement of the century, recommended copious dilution by mere water as a useful method of occasionally dissolving stone ; and this probably, together with previous empirical experience, led to the employment of the natural alkaline waters as an article of scientific practice. At length the discovery in recent times of the variable nature of urinary calculi occasioned the substitution of acids for alkalis in some forms of the disease, and the material error of administering alkaline remedies in a more concentrated form under the supposition that their solvent power would be more effectually exerted. Up to this period the sentiments of physicians, surgeons, and chemists were much divided as to the real value of the solvent methods of cure ; and on the whole, although the treatment by alkalis and acids has always been admitted to be very serviceable in gravel as a positive cure, and also in calculus as a palliative for correcting the calculous diathesis, its reputation as the means of absolutely destroying stone in the bladder has been declining.

Very recently however, a new impulse has been given to medical belief on this subject; and the researches of *Sir Benjamin Brodie* in England, and those of *Messrs. Petit* and *Chevallier* in France, seems to show that the solution of calculus in the bladder is not by any means so hopeless an undertaking as many in the present day are apt to imagine.

Solvents are administered either by the mouth, or by directly injecting them into the bladder; but the former method is commonly preferred.

In cases of lithic calculus, the solvent generally preferred is the bicarbonate of soda, which is administered to the extent of three, four, six, or eight drachms in a day, largely diluted with two or four pints of water, or in the form of a natural mineral water, such as that of Vichy. In phosphatic calculus the nitric or muriatic acid, in a state of considerable dilution, has been generally considered the most appropriate solvent. But, although no doubt can exist of relief being thus often obtained from suffering, and though some positive cures have been recorded, the efficacy of these remedies is questionable, more especially as they seem at times to act injuriously by merely changing the diathesis and leading to the substitution of lithic for phosphatic deposition. In the present day the acids may be for the most part abandoned; since it has been fully proved, that in opposition to the belief recently entertained, the phosphatic diathesis is not aggravated by the alkalis when properly administered, and that their bicarbonates largely diluted will correct the diathesis, and dissolve calculous concretions even more effectually where the deposit consists of the earthy phosphates, than where it is composed of lithic acid and lithate of ammonia. For the proof of the efficacy of the alkaline bicarbonates in dissolving phosphatic as well as lithic calculus, medicine is mainly indebted to the late experiments and observations of *M. Petit* and *M. Chevallier* made with the aërated alkaline water of Vichy. They found that calculi of lithic acid, ammoniaco-magnesian phosphate, or the mixed phosphates, when immersed in the mineral water of Vichy at the temperature of 96° Fahr., were completely dissolved in no great number of days, provided the water was often changed or supplied in a continuous stream; but that comparatively little impression was made upon calculi consisting of the calcareous phosphate alone, or of oxalate of lime. Now it is easy to administer bicarbonate of soda, either in the shape of an alkaline mineral water, or in the state of simple solution, in such quantity as to communicate solvent properties to the urine; and therefore the solution of calculus in the bladder does not appear by any means so impossible a problem as most have believed. In fact, since the researches of *Petit* and *Chevallier* fixed the proper method of administering alkalis, a considerable number of unequivocal cures have been published, where a calculus of some magnitude was distinctly ascertained in the first instance to exist in the bladder, and after a few weeks was discharged in the form of a small corroded concretion, leaving the bladder quite free. Diluted solutions of the alkaline bicarbonates seem equally applicable to the treatment of cystic-oxide calculi as to those already mentioned. In short, the only varieties in which they are not likely to prove of service are those composed of phosphate or oxalate of lime, which constitute about the twentieth part of the whole; and even here the remedy, if it does no good, can at all events do no harm. It is an interesting fact, that although the diluted alkaline bicarbonates have a decided solvent power over urinary calculi both within and without the bladder, yet, according to the researches of *Mr. Brande* made some time ago, the carbonates have no such influence even upon lithic calculus out of the body.

As it has been thought by some to be difficult to impart to the urine a sufficient solvent power by means of remedies taken into the stomach, it was long ago proposed to introduce the solvent material into the bladder. But although the proposal was plausible, and success was announced so early as the middle of the last century, the method by injection has gained few converts, because a dread has been entertained lest the solvent should exert its properties on the

bladder as well as upon the stone. This dread was no groundless one, so long as it was conceived that calculi could not be attacked except by acid and alkaline solutions of considerable strength. It being now however well ascertained that concentration is far from necessary, it is time that the speculations of our predecessors should be put to the test of experiment on a large scale, with weak solutions of acids or alkaline bicarbonates. The attempt has been already encouraged by the example of *Sir Benjamin Brodie*. He has proved that a mixture of two minims and a half of nitric acid in every ounce of water may be injected with perfect safety, even into a tender irritable bladder ; and in one instance he succeeded in accomplishing a cure by using an injection of this strength for fifteen or thirty minutes, every two, three, or four days. (*Lond. Med. Gaz.*, viii. 355.) The best method of practising injections into the bladder is to introduce a double-tubed catheter, and with the aid of any convenient contrivance to make the dissolving liquid pass and repass several times so as to maintain a continuous stream. In cases of lithic calculus the liquid may be either of a weak solution of bicarbonate of soda, or lime-water : in the case of the earthy phosphates it may be either water acidulated with nitric acid, or the solution of bicarbonate of soda.

The only other remedy which requires mention here is one which has never been fairly tried, but to which some have looked with considerable confidence for the means of disorganizing, breaking up, and removing calculus in the bladder. This is galvanism. It has been proved that calculi, especially of the phosphatic kind, if included between the points of the conductors of a galvanic battery, may be gradually broken down and reduced to the state of sandy gravel ; and it has been further ascertained that a calculus, introduced into the bladder of one of the lower animals between the conductors of the battery, may be thus treated, and eventually destroyed, without any injury being occasioned, or even any material pain. These facts were established some years ago by *MM. Prevost* and *Dumas ;* but they have not hitherto been applied to practice.

The treatment of calculus when arrested in its passage along the urethra belongs strictly to the surgeon's province, and therefore needs mention only cursorily here. The discharge of the calculus may be sometimes accomplished by means of the warm-bath, a full opiate, a strong purgative clyster, or a tobacco injection : but frequently it cannot be removed without an operation. An attempt may be first made to extract it by means of the urethral forceps ; and should this prove unsuccessful, an incision must be practised into the urethra over the calculus.

DIABETES.

The term DIABETES has a twofold signification in the present day. Some restrict it to cases where the urine, abounding in quantity, is also saccharine in nature. Others, using the term in its original sense, apply it to all cases where the urine is increased in quantity materially, uniformly, and independently of the administration of diuretic substances ; and they distinguish two species, the saccharine or *diabetes mellitus*, and the simple or *diabetes insipidus*. The former is a precise term, graphically designating a special diseased condition of the urine. The latter is inaccurate, because the urine is seldom tasteless, and also vague, in so far as it has been hitherto employed to include several morbid states of the urine as worthy perhaps of being distinguished from each other as saccharine diabetes from the whole of them collectively.

DIABETES INSIPIDUS.

Varieties. — Causes. — Treatment.

THREE distinct conditions of the urine have been usually arranged under the head of diabetes insipidus, but have been correctly distinguished from one another by every late writer of repute. In one the urine is simply diluted ; in another it is defective in the proportion and daily discharge of urea ; in the third the urea is in excess, both relatively to the other ingredients of the urine and likewise in respect of its own daily average discharge in health. To the last of the three the term *insipidus* is inapplicable, because the urine presents its natural, peculiar, strong taste, heightened rather than diminished. The three states have been conveniently designated by *Dr. Willis*, Hydruria, Anazoturia, and Azoturia, that is, watery, deazotized, and hyperazotized urine.

A uniform increase in the quantity of urine, from simple dilution merely, is an affection by no means uncommon, and not always deserving the name of a disease. Some people from the habitual heedless indulgence of thirst drink an unusual quantity of diluent fluids, the watery part of which passes off copiously by the kidneys. The same is often the case with the habitually intemperate, especially those who indulge to excess in the use of such liquors as London gin ; and *Dr. Venables* says he has observed a similar condition of the urine from the inordinate use of acids, especially vinegar taken for guarding against corpulency, and also from the excessive use of effervescing draughts or soda-water. In others, who observe an ordinary diet as to drink, the urine is habitually increased by constant exposure to a cool atmosphere, especially in a sedentary occupation. Others present the same peculiarity from constitutional causes, and most generally in connexion with unusual nervous excitability. A familiar example of the last kind is the occurrence of diabetes in females affected with hysteria ; and equally characteristic instances may be occasionally met with both in males and females of a nervous temperament, though not liable to hysteria, in whom the affection shows itself by profuse discharge of watery urine in the forenoon chiefly. In all these varieties of hydruria, or simple diabetes, there is no departure from the healthy condition of the urine, except that it is pale, low in density, and very watery. Its healthy ingredients are all present, in due proportion to each other as well as quantity. There is likewise no constitutional derangement referrible to the increased renal discharge. The affection, in short, scarcely amounts in correct language to disease.

There is one description of cases, however, somewhat allied to those now mentioned, which constitute a true disease, a real diabetes insipidus, where the thirst is incessant and urgent, the flow of urine excessive, and harassing from the frequency of the calls to pass it, the appetite increased, and the mind and body somewhat impaired in tone, so as to be incapable of continuous exertion or steady application. Such cases have been sometimes confounded with diabetes mellitus. But they are at once distinguished by the urine being very low in density, destitute of sugar, and charged with its usual ingredients in such quantity as to yield the natural amount of daily solid excretion ; to which it may be added that, although the body is unusually spare, there is not progressive emaciation and debility. Some cases of this nature have been observed which prevailed throughout life without abatement. In general it is a more temporary affection, though still always protracted and obstinate. In the most inveterate forms, the thirst and diuresis continue during the night as well as the day ; but sometimes both symptoms diminish in the early part of the night, and disappear

in a great measure for some hours in the early part of the morning,—again to break forth, however, on the patient awaking for the occupations of the day. The quantity of urine discharged is sometimes enormous. The writer had lately under his care a case of the kind where from twenty-four to thirty pints of urine of the density 1004 were passed daily for several weeks; and some years ago was shown a case by the late Dr. Duncan, junior, where for a very long period the daily discharge was forty pints, and the density generally 1001.

The nature and cause of this form of disease are obscure. The most generally received doctrine regards it as fundamentally an affection of the organs of digestion producing inordinate thirst, and consecutively diuresis; but the nature of the primary disorder is unknown. It is most frequently met with among young adults of the labouring population. The treatment consists in the use of bitter tonics, opium, a nutritive unstimulating diet, destitute of articles either diuretic or provocative of thirst, and the due regulation of the appetite for liquids. The drink should be gradually diminished in quantity, allowed only in small portions at a time, and given sometimes acidulated with the mineral acids, sometimes in the form of soda-water. Where the disease occurs in a nervous temperament, metallic tonics, a generous diet, and vigorous exercise, especially in the forenoon, constitute the most serviceable remedies. When purgatives are necessary, the oleaginous and resinous kinds should be preferred, and the saline sorts avoided, as well as all others which may act diuretically.

The second disorder, usually arranged under the head of diabetes insipidus, is an inordinate flow of urine defective in the daily amount of urea. This form of diabetes corresponds nearly with the Anazoturia of *Dr. Willis*, to which, however, an increase in the quantity of urine is not altogether essential. The characters of the urine are extreme paleness and absence of odour, great diminution of density, so that it sometimes scarcely exceeds that of ordinary water, a feeble ammoniacal odour when kept, together with the formation of a white pellicle of the ammoniaco-magnesian phosphate, and extreme deficiency either of the whole solids or more peculiarly of urea. *Dr. Venables*, who describes a similar affection under the name of Diuresis simplex, maintains that the urine, even when fresh, generally abounds in carbonate of ammonia, into which the urea would appear to be resolved. (*Med. Gaz.*, xxiii. 814.) *Dr. Willis* has classified together a number of cases published by various authors where these characters were presented; shows that the disorder is usually attended with thirst, gnawing at the stomach, white tongue, constipation, parched skin, emaciation, debility, and lowness of spirits; and infers that it is connected in adults with organic diseases, or in children with the irritation of teething, or disordered digestion consequent upon weaning and improper food. In the experience of the writer it has been almost always referrible in adults to one or other of those forms of organic disease of the kidney which have been usually considered as belonging to the generic affection, granular degeneration; and in a majority of instances where an inspection was made after death, the kidneys were found much shrivelled, rugose, or roe-like on their surface, and with most of their cortical and much of their tubular structure destroyed. This subject will be taken up in detail under the head of GRANULAR DEGENERATION, in the division of ORGANIC DISEASES OF THE KIDNEY. In the meantime it may be observed that in frequent instances, where the kidneys were found extensively diseased, and where death evidently arose from one or other of the affections secondary to granular degeneration, the urine presented for a long period the characters described above, being from five to ten, or even twelve pints in quantity, between 1004 and 1008 in density, slightly coagulable by heat and nitric acid, almost colourless and deprived of one-half, three-fourths, or even more of its urea.

For the treatment of this affection, in so far as it occurs in connexion with granular disease of the kidneys, the reader is referred to the article on that subject. The treatment recommended by *Dr. Willis* for anazoturia consists

in the administration of gentle aperients of the resinous or oleaginous kinds, bitter tonics, diaphoretics and anodynes, together with light nourishing diet composed chiefly of farinaceous and animal food, and slightly acidulated drink in moderation.

The third and last variety of diabetes insipidus is so named rather because the urine is destitute of the saccharine taste remarked in diabetes mellitus than with reference to the correct meaning of the specific name. It comprehends the cases characterized by an excessive secretion of urine superabundant in urea, and has been aptly designated by *Dr. Willis*, Azoturia. *Dr. Bostock* and *Dr. Prout* were the first to direct the attention of the practitioner to this disorder. It approaches saccharine diabetes in all its characters, except in so far as sugar is not present in the urine ; and it is conceived by some to constitute occasionally the first stage of that disease. The urine is sometimes pale, at other times deeper coloured than natural, generally from four to eight pints in daily quantity, occasionally so high as sixteen pints, usually high in density, namely, between 1030 and 1035, but sometimes not above *Dr. Gregory's* average of 1024 or even 1020, always abounding in urea whatsoever the density, and commonly to such a degree as to yield crystals when treated with nitric acid without previous concentration, especially if exposed to moderate cold. The daily discharge of urea is at times very great : in an instance mentioned by *Dr. Bostock* it amounted to no less than nine ounces and a half, which is about four times the full proportion of health. The general symptoms are much the same with those which are to be described presently as characterizing saccharine diabetes, but they are less in degree. There is much irritability of the bladder, occasioning frequent and urgent calls even during sleep, some thirst, at times inordinate appetite, though not invariably uneasy gnawing sensations in the stomach, and more rarely some degree of dyspepsia, a feeling of languor, debility, and mental depression, an anxious expression of countenance, and a tendency to emaciation. These complaints, more especially the flow of urine, are apt to be increased by cold weather, and still more by mental emotions.

The *causes* of the affection are obscure. It has been observed most generally after the middle period of life, in connexion with previous free living, habitual indulgence in alcoholic fluids, or early sexual excess, especially masturbation ; or it has seemed to rise from irritability of the bladder, in connexion with diseased prostate, hæmorrhoids, and frequent attacks of gonorrhœa. In children, too, it is probably not uncommon, as appears from the statement of *Dr. Venables* and *Dr. Willis ;* who both mention that in children between six months and fourteen years of age they have repeatedly met with an inordinate flow of urine highly loaded with urea, attended with frequent calls, involuntary micturition at night, urgent thirst, voracious appetite, and emaciation. The causes of the affection in the latter circumstances are obscure ; but it is generally found to end, if neglected, in tabes mesenterica and other inveterate strumous disorders.

The *treatment* of Azoturia has been well laid down by *Dr. Prout* and *Dr. Willis*. It is often successful, though the success is frequently but temporary. There can be no doubt that some of the alleged cures of saccharine diabetes have really been nothing else than this disorder, the reporters of the cases having contented themselves with ascertaining that the density of the urine was unusually high, and having neglected to determine positively the presence of sugar. When the circulation is in a state of excitement, and the patient disposed to restlessness, it is right to begin by drawing a little blood from a vein. Afterwards food in moderation, easily digestible, and composed of a rather large proportion of farinaceous matters, must be enjoined, together with the sparing use of diluent drinks acidulated with nitric or muriatic acid, or alkaline and aerated as in the form of soda-water. Opium must be given regularly as a calmative and anodyne, and is perhaps the principal remedy. The general

tone of the system should also be improved by the administration of bitters, **or** still better perhaps of chalybeates: and the functions of the skin must be maintained by a moderately warm atmosphere, as much active exercise as may be well borne, the employment of the warm bath every other evening, and sometimes also the addition of ipecacuan to the opium in the shape of Dover's powder. A tendency to constipation which generally prevails must be encountered with gentle laxatives. All excesses of the table and otherwise must be carefully shunned. *Dr. Venables* says he has found a combination of kino with opium useful in reducing the amount of the urea; and he further recommends that the drink should consist in part of almond emulsion, where the neck of the bladder is very irritable, and the calls to pass urine frequent. Alterative treatment might seem advisable; but mercury ought not to constitute a part of it, as mercurials rather tend to increase the urea.

DIABETES MELLITUS.

Definition.—History.—Symptoms.—Characters of the urine.—State of the functions of the alimentary canal.—Of the blood and circulation.—Of the cutaneous functions.—Of the function of nutrition.—Pathology and anatomical characters.—Prognosis.—Treatment.

AUTHORS even in the most recent times have differed with one another regarding the correct definition of diabetes mellitus; and although this may appear somewhat singular, considering the very prominent external characters of the disease, it is no more than ought to be expected from the present want of clear and precise views of its pathology. The definition, " *A discharge of saccharine urine, with great tendency to emaciation and suppressed transpiration,*" is probably less open to dispute than any other. Yet not one of the conditions embraced by it is altogether essential; for medical treatment may arrest for a time the emaciation, as well as restore in a great measure the functions of the skin; and the saccharine impregnation of the urine, possibly sometimes wanting at the commencement, is at all events undoubtedly absent often for many days before the close in fatal cases. There can be no question, however, that the presence of sugar in the urine is by far the least variable of the phenomena which have been hitherto carefully studied; and that in many cases and circumstances, where this character was supposed to have been wanting, sugar might have been discovered by the more exact methods of chemical examination which are applied to the inquiry in the present day. The mere presence of sugar, however, in the urine is not alone sufficient to constitute the disease; at least *Dr. Prout*, as formerly observed, has maintained that sugar is at times present in dyspeptic and gouty people of advanced years without either increase of urine or constitutional derangement (p. 13).

It is probable that the ancient physicians, although they misunderstood the characters, were nevertheless not unaware of the existence, of diabetes mellitus. This seems a legitimate conclusion from passages in the writings of Celsus, Ætius, Alexander Tralles, and especially Aretæus, who was aware of the tendency of the disease to induce emaciation, and considered it as a colliquation of the solids into urine. The earlier modern physicians contributed little or nothing to the knowledge handed down from the time of Aretæus; and it was not till 1684 that two of the most obvious and interesting characters of the disorder were determined by *Willis*, namely the sweet taste of the urine, and the frequent excess of that secretion over the quantity of liquids introduced into the body through the digestive organs. It was not till after the lapse of another century that any further advancement was made towards a correct acquaintance with

its features, pathology, and treatment. But at length the inquiries of *Dobson* and *Home* into its pathology in the last quarter of the late century, with the observations of *Rollo* respecting its treatment, and the chemical researches of *Cruickshank* into the nature of the urine, paved the way for a whole host of modern inquirers, among whom the names of *Henry*, *Bostock*, *Prout*, *Lublock*, *Nicolas and Guendville*, *Bardsley* senior and junior, and *Macgregor*, stand most conspicuously ; and whose united labours have rendered the singular properties of diabetic urine, and the multifarious phenomena of the malady itself, familiar to every physician, while they have also unfolded many valuable facts relative to its intrinsic nature, and established some important practical rules for its treatment.

Symptoms.   Diabetes always begins with very obscure symptoms.   Its presence is very seldom suspected until it is so far advanced that the urine has decidedly acquired a saccharine impregnation.   At all events a true saccharine diabetes has not hitherto been traced satisfactorily in any instance by symptoms prior to the excretion of sugar by the kidneys.   The inference however would not be legitimate that the excretion of sugar is one of its earliest signs, and still less that this character exists from the very commencement.   For, how soon soever the attention of the physician or patient may be turned to the sweet taste of the urine, he will invariably find from other symptoms, such as the frequent or excessive discharge of urine, that the function of the kidneys has been materially deranged for a long time before.   It has been already observed that, in the opinion of some, a *diabetes insipidus*, or excessive flow of urine, either defective, or more abundant than usual, in its natural contents, but without the presence of sugar, may form the earliest symptoms of saccharine diabetes ; and the experience and researches of *Dr. Prout* in particular seems to render it not improbable that a superabundance of dense urine, loaded to excess with urea, may precede the stage at which sugar is secreted.   But there is no certainty upon that very interesting question in the symptomatology of the disease.   No case of well ascertained *diabetes insipidus* has hitherto been clearly traced passing into *diabetes mellitus ;* and it is further well established, that until sugar is discharged with the urine, the disease is not accompanied by great constitutional disturbance.   The description of the symptoms must therefore be commenced for the present from the period when the essential saccharine property of the urine is fully formed.

The first symptoms which attract the patient's attention are frequent evacuation of the bladder, indicated unequivocally by the necessity of awaking for the purpose several times during the night, superabundant discharge of urine, paleness of this secretion, with diminution of its proper odour ; an inordinate appetite, sometimes attended with dyspeptic complaints ; excessive thirst ; dryness and harshness of the skin ; loss of virtlity ; and rapid loss of flesh and muscular strength.   These too are the leading symptoms which continue to prevail at the time when curiosity on the part of the patient, or a careful professional scrutiny, leads to the discovery that the urine abounds with sugar.   For many months, or even for several years, no material change may occur in the phenomena.   At length, however, the weakness or emaciation having increased all the while more or less steadily, death takes place either slowly from progressive exhaustion, or more quickly from sudden sinking occasioned by injudicious attempts to restrict too much the food and drink, or more indirectly through the formation of phthisis pulmonalis, granular disease of the kidneys, or some other incidental acute or chronic disorder.   Such is a brief sketch of the leading features of *diabetes mellitus ;* which it will be necessary now to fill up.   The clearest impression of them will probably be obtained by classing the symptoms according to the organs and functions chiefly affected ; and therefore the following remarks will present a view of the symptoms referrible, 1, to the functions of the kidneys ; 2, to those of the alimentary canal ; 3, to the condition of the blood and circula-

tion ; 4, to the state of the cutaneous functions ; 5, to the functions of nutrition ; and, lastly, to secondary or incidental affections.

Characters of the urine. The pathognomonic character of saccharine diabetes is the peculiar state of the function of the kidneys, occasioning a marked departure from the healthy properties of their secretion.   The urine is increased in quantity both absolutely, and likewise for the most part in relation to the fluid contained in the drink and food ; it is also commonly increased in density, in its proportion of solid contents, and in the amount of solids daily discharged by it ; and, further, it is essentially altered in its sensible qualities and chemical constitution.

One of the earliest symptoms, and invariably present afterwards until the disease begins to yield to treatment, is increase of the urine in quantity.   When a case is first brought under treatment, the urine is found seldom to be under ten imperial pints in twenty-four hours ; the average lies between fifteen and twenty-five pints ; and occasionally it is observed to amount to the enormous quantity of thirty-six, forty, or even fifty pints.   Some have not hesitated to assign even a wider limit, and 200 pints have been mentioned as having occurred in an actual case ; but such facts are of doubtful authenticity.   Unless under the influence of treatment, the quantity of urine is very rarely so low as the natural standard, especially in the more advanced stages ; but at an early period it is not uncommon to find the quantity reduced by treatment to between fifty and sixty ounces, or a trifle above the amount of health.   Not only, however, is the quantity increased absolutely ; a more remarkable character of the urine is that it may be increased, so as habitually to exceed the whole fluids contained in the food and drink.   This, though not a constant, is a common occurrence.   It depends partly on the absorption of the fluids of the body in the course of the patient's emaciation, but in a greater degree on moisture being absorbed by the surface of the skin, or membrane of the pulmonary air-cells.   That the excess of fluid in the urine is derived from without, and not from the body itself, plainly appears from the interesting fact mentioned by *Dr. J. L. Bardsley*, that the liquid discharged may exceed the alimentary fluids even where the patient is gaining weight.   The difference is sometimes excessive.   In a case not long ago under the care of the writer, it was ascertained, that, for at least four days, the liquids of the food and drink amounted to 48 ounces daily, while the urine was no less than 240 ounces.

A character of the urine scarcely less constant is an increase in its density, together with an increased proportion of solid contents, as well as an increased discharge of solids daily.   The density of diabetic saccharine urine has been sometimes observed so low as 1020, in the writer's experience 1021 ; and under the influence of treatment it is not unusually brought down to 1032, 1030, or 1026, which are all within the limit of health.   But far more generally, and almost invariably, where the case has not been for some time subjected to careful regimen, the density varies from 1035 to 1040, reaches frequently 1042 or 1045, and in some instances has been observed so high as 1050, or even 1055, which last is the highest that has ever come under the observation of the writer. Even higher densities have been mentioned, but they are not very authentic. In the case referred to, the average urine of the day was taken, the hydrometer was corrected by the weighing-bottle, and on four successive days the density was found to fluctuate between 1055 and 1055·4.   It may be inferred from the increase of density, that the proportion of solids in the urine must also be increased.   Instead of fluctuating between 30 and 68 parts in the thousand, which may be assumed as the healthy limits, the proportion often rises in saccharine diabetes to 90, 100, or 120 ; and the writer has observed it so high as 136.   Further, the increase of density and proportional solids infers an increase in the daily discharge of solid matter by the urine.   This circumstance, which was first distinctly dwelt on by *Cruickshank*, is one of the most pathognomonic characters of the secretion ; and it is also one of the chief characters by which

the physician may correctly judge of the progress of a case, and of the influence of treatment. The daily discharge of solids by the urine was formerly stated seldom to exceed two avoirdupois ounces and a half in the highest health. But in diabetes, it is not uncommon to find the solid discharge so great as 22 or even 32 ounces ; and in a case once under the writer's care, the amount was so high as $36\frac{1}{3}$ ounces daily for a week together. The quantity of solid matter discharged daily by the urine ought always to be a principal object of attention in studying and treating a case of saccharine diabetes. It is easily found by a simple formula, when the density and daily quantity of urine are known. The late *Dr. Henry* determined the fact, that the quantity of solid matter in one thousand parts of diabetic urine is equal to the excess of its density over that of water, multiplied by the number 2·58. According to the writer, however, the correct number deduced from many experiments is 2·33. Hence the daily discharge of solids may be found by the formula $D' Q \times 0\cdot00233$, in which Q represents the quantity of urine, and D' the excess of its density over that of water. Thus, in the case last alluded to, the daily discharge of 36·3 ounces is found from the density 1050, and the quantity *per* day 312 ounces, D' being here equal to 50, and Q to 312. Another remarkable character of the urine is that the daily discharge of solids exceeds frequently the amount of solids taken in the form of food. This is by no means so constant a character as those already mentioned. It may easily be ascertained while the patient is under strict regulations as to food and drink, because the proportion of solids contained in the simple aliments which he is allowed to use is well known. Meat, for example, contains about a fourth of solid matter, bread two-thirds, milk one-seventh, cheese nine-tenths, beef-tea and mutton-tea about an eighth. From these numbers it is easy to calculate pretty closely the ounces of solid matter consumed daily as food.

Not less remarkable than the properties of the urine already mentioned, are the changes which take place in its sensible qualities and chemical constitution. It is paler in colour than natural, presents a less characteristic urinous odour, is generally almost, if not altogether, free of deposit on cooling, and possesses for the most part a decidedly sweet taste ;—it is often deficient in urea, commonly deficient also in lithic acid, sometimes impregnated with albumen ;—and, with a few rare and even doubtful exceptions, it contains a large quantity of saccharine matter, identical in properties with grape-sugar. Its properties vary at different periods of the day ; that which is passed in the latter part of the day being commonly furthest removed from the healthy state. In the early stage of the disease, and still more when the case has been for a few weeks under treatment, the natural colour and odour, and even the urinous taste, may be in some measure present. But in all cases which have either been for some time neglected or are far advanced, the urine is nearly free of colour, its proper odour is wanting, or a mawkish sweet odour is substituted, it remains clear on cooling, and its taste is distinctly saccharine. Lithic acid is seldom present in any material quantity, and the earthy salts too are less abundant than usual. Till of late, on the authority of *Nicolas, Cruickshank*, and *Bostock*, it was believed that urea was always wanting. It was shown, however, by *Henry*, that, although he could not detect urea by the ordinary characters of this principle, it might be proved to be present in small quantity, by the property which the urine possesses of giving off carbonate of ammonia at the boiling temperature, a property which no other principle except urea could communicate. Others have since contributed more positive facts of the same purport. And at length it has been recently proved by *Mr. Macgregor*, that urea is probably always present in diabetic urine ; that its proportion to the water of the urine, though commonly less, is at times positively greater, than in the healthy state ; and that the absolute quantity discharged in a given time is more frequently above than below the natural standard. By first destroying the sugar by the process of fermentation, then concentrating the urine, and treating the residuum with

alchohol, he obtained a substance with all the properties of urea, which in one instance constituted 43 parts in 1000 of the urine ; and in four cases amounted to 512, 810, 945, and 1013 grains in twenty-four hours. It has been before stated that the largest proportion of urea assigned by any chemist to healthy urine is 30 parts in 1000 ; and that, proceeding upon that supposition, the daily discharge of urea may be considered 510 grains. These highly interesting and satisfactory conclusions of *Mr. Macgregor*, the writer can confirm from his own frequent observation. More than ten years ago he found that urea might always be found in diabetic urine after the destruction of the sugar by fermentation ; for some years past he has only once failed to detect it by the ordinary process of concentration, and the addition of diluted nitric acid ; and in the last eight cases where this plan was followed, it was plain, from the liquid becoming a firm magma of scaly crystals, that the urea was increased in its daily quantity at least, if not also at times in its proportion. In a rather recent case, at present under the writer's care, the urine yields abundant crystals of nitrate of urea without being previously concentrated ; and in this and another patient, also now under his care, the daily urea, during a pure animal diet, has been, for weeks together, so high as 630 and 884 grains. The failure of many experimentalists to discover urea, may be accounted for in a variety of ways, which it would be out of place to mention here. The plan which proved successful in the trials just alluded to, consists in concentrating the urine quickly over the vapour-bath at a temperature not exceeding 200° F. till a sixth part of its original volume remains ; to add to this half its volume of the diluted nitric acid of the Edinburgh Pharmacopœia (consisting of equal weights of acid and water) previously cooled, and to allow the action to go on for some hours, aided by exposure to a moderate degree of cold. A firm magma of crystalline scales is not unfrequently thus formed in two or three hours, where no appearance of crystalliaztion presented itself earlier. The only other important alterations, and by much the most invariable changes which the urine undergoes in its chemical constitution, are those connected with the presence of sugar.

The presence of sugar may often be discovered by the taste of the urine. This, however, is a fallacious criterion,—at least as a test of the absence of sugar : and it consequently ought never to be relied on in the investigation of a suspected case, and still less for determining the real state of a case of apparent amendment. Frequently the urine has not a sweet taste, although one-half its solids consist of sugar ; and simply, because the taste of this principle is obscured by the co-existence of the ordinary ingredients. The taste is seldom characteristic, unless the urea and other natural ingredients are materially defective in their proportion. Sometimes, when the taste of the urine itself is indistinct, the sugar may be detected by this sense in the residue left on evaporation to dryness. In all cases, it may be proved to exist by the action of nitric acid, aided by heat, in developing oxalic acid. But the simplest, most characteristic, and most delicate test of the presence of sugar is the process of fermentation with yeast. The addition of yeast to healthy urine does not give rise to any change ; but if sugar be present, and the temperature be raised to about 80°, effervescence immediately ensues, a brisk discharge of gas takes place, and at length a yellowish fluid is formed, which has the odour of beer, and yields an alcoholic liquor by the process of distillation. The test is so delicate, that, as the writer has found, one part of diabetic sugar may be detected by it in 1000 parts of healthy urine, of the density 1030. It is further an easy, and the only correct mode of ascertaining the quantity of sugar. Every cubic inch of carbonic acid gas given off by fermentation corresponds in round numbers with one grain of sugar, or forty-seven of gas to forty-five of sugar. Hence the quantity of sugar may be easily found by filling a graduated tube with mercury, leaving space enough for a little more than the requisite quantity of urine, which is then to be introduced ; next filling up what remains of the space with yeast, and, with the finger on the open end of the tube,

reversing the tube in a vessel of mercury; and then placing the apparatus where it may be exposed to a heat of 70° or 80° for twelve or twenty-four hours.   The sugar of diabetes exists with various modifications in different cases.   Sometimes, though rarely, it is chiefly in the form of crystallizable sugar.   Sometimes, as in a case which the writer had recently an opportunity of examining, it crystallizes in grains on the edge of the chamberpot by spontaneous evaporation; and, by concentration over the vapour bath, is obtained at once in extremely pure light-gray grains, identical in every character with grape-sugar.   More generally concentration yields a confused or obscure brown sandy crystallization.   Sometimes the residuum is not crystallized at all, but forms a thick syrup of a honey-like odour, which, under protracted heat, dries into a substance like barley-sugar.   And in all circumstances, the prolonged application of a rather elevated temperature converts the crystallizable into uncrystallizable sugar.   The saccharine principle of diabetes, like other natural sugars, seems therefore to consist of varying proportions of a crystallizable and uncrystallizable substance.   The best mode of obtaining the crystallizable part in ordinary cases, is to form an extract with as little prolongation of the heat as possible, to remove the uncrystallizable syrup by agitation with cold rectified spirit, and to boil the residual crystallizable portion in more of the same fluid, from which it will separate in grains on cooling.

Such are the leading properties of the urine in diabetes mellitus.   Other deviations from the natural condition, of more rare occurrence, and probably depending on incidental causes, may be now also briefly mentioned.   One of these is a tendency to early putrefaction, and the developement of ammonia. This phenomenon, opposed as it is to the customary condition of diabetic urine, which for the most part corrupts slowly, occurs chiefly in connexion with dyspectic symptoms, and of course, cannot present itself, unless where the urea is tolerably abundant.   Another character of rare occurrence, at times connected with stomach complaints, but occasionally obscure in its relations, is the copious deposition of earthy phosphates not long after the urine is passed. Another rare property, particularly mentioned by *Dr. Prout*, and which the writer also has observed in one instance, is the spontaneous developement of vinous fermentation, owing to the urine containing a species of ferment, which *Dr. Prout* considers to be modified chyle.   This peculiarity might be observed more frequently, were it not that the urine in this climate is kept, during a considerable part of the year, at a temperature unfavourable to the process of fermentation.   Another character, more frequently observed, is the presence of albumen, as indicated by heat.   It is not uncommon to find, that when diabetic urine is concentrated to a half or fourth of its volume, flakes are detached in small quantity.   But sometimes, especially in rather advanced cases, a considerable coagulation is at once occasioned by heat, and continues after the addition of nitric acid, clearly evincing the presence of albumen.   Albumen when thus unequivocally existing, will probably be found to be associated with granular disease of the kidneys as a secondary or incidental disorder.   At least, two cases of the kind have been lately traced satisfactorily by an inspection after death in the Edinburgh Infirmary; and in one of these, which will be adverted to hereafter, the sugar, at one time excessively abundant, gradually disappeared; the albuminous impregnation at the same time became more and more distinct; the density of the urine fell from 1050 and 1055 to 1010; and for more than three months before death the patient had scanty, pale, coagulable urine, low in density, and not fermentable.

Before leaving these remarks on the pathological characters of the urine, it may be right to present a summary of them, according to the state of progress of the disease.   In the earliest period, it is not improbable that the urine is characterized by being above 1030 in density, high in colour, and abounding in urea as well as other natural ingredients.   Most generally, when first carefully attended to, it is found very pale, scarcely urinous in its odour, little prone

to become ammoniacal when long kept, high in density, excessive in quantity, defective in the proportion of urea but not in its daily quantity, defective also in its proportion of earthy salts, and abounding in sugar, which communicates a sweet taste and the property of fermenting with yeast. Should the case, however, have been previously for some time under proper treatment, then the colour of the urine is often less pale, its odour somewhat urinous, and, under long keeping, ammoniacal; its quantity not so excessive, yet still always superabundant, especially considering its high density; the proportion of urea more abundant, its daily quantity excessive; and sugar also present, though frequently it is not to be detected by the sense of taste. As the disease advances, the influence of treatment here laid down ceases to be so manifest; the less favourable characters previously mentioned recur; and not unfrequently there is also some albumen, which may be separated by coagulation with heat. Lastly, towards the close, where death does not arise from incidental or secondary disorders, the natural condition of the urine is often observed to be restored for nearly a week or even upwards;—the quantity, colour, odour, and density being much the same as in health, the urea in the natural proportion, the sugar wanting, and the chief deviation observed from ordinary urine being, that putrefaction ensues with unusual speed.

State of the functions of the alimentary canal. It has been held by some authors, that the more characteristic symptoms of saccharine diabetes are invariably preceded by disorder of the functions of the stomach, of the nature of dyspepsia. It may be questioned, however, whether such is even generally the fact. In repeated instances, at least, the writer has been unable to discover that any stomach complaints whatsoever preceded the excessive discharge of urine.

When the disease is fully formed, there is usually urgent thirst and inordinate appetite; the tongue is clammy, reddish on the edge, sometimes altogether reddish and clean, more usually whitish, and often with a brown streak down the middle; the gums are reddish and tender; the throat dry; the breath often of a sweetish odour, like that of hay; and the bowels constipated, and liable to colic pains. The thirst is sometimes excessive and uncontrollable, so that twenty, thirty, or even forty pints of liquid are consumed in the day. The appetite is also commonly greater than natural. The urgency of this symptom, however, has been overstated by many authors. When the case is not under treatment it is often strong, or almost ravenous, probably because, on account of the inordinate quantity of liquid swallowed at the same time, a proportion of the food passes through the stomach imperfectly digested. But very generally where proper treatment is enforced, and not unfrequently even under other circumstances, although the craving for food is considerable, the appetite is easily enough satisfied; and the daily food consumed, though apparently great, compared with what is used by the invalid patients of a hospital, is really not much greater than is required in a state of health. Diabetic patients, when once fairly put upon regular living in hospitals, although their craving for food may have previously been considerable, require more food for appeasing their appetite than what contains between twenty and twenty-eight ounces of real dry nutritive matter; which is fully one-fourth less than what is contained in the navy allowances for seamen. Occasional attacks of dyspepsia are not uncommon throughout the whole course of the disease, and towards the close this affection is often troublesome, and attended even with a failure of appetite.

One of the most important facts relative to the state of the alimentary functions is the late discovery by *Mr. Macgregor*, that sugar is abundantly formed in the stomach by the process of digestion. *Mr. Macgregor* states that he has repeatedly found sugar by the process of fermentation in the contents of the stomach vomited after digestion had begun, and that he has likewise detected it in abundance in the fæces, both by fermentation and by crystallization. He further adds, that sugar may even be found in the half-digested food where no

aliment had been taken for some time before, except of an animal nature; that the quantity, however, is much increased under a vegetable diet; and that in some circumstances, he has detected the same principle in the saliva. These are the most valuable and important of all the facts which have been for some years contributed to the pathology of saccharine diabetes; and it is, therefore, much to be desired that their accuracy were put to the test of further observation by others.

Condition of the blood and circulation. In the early stage of diabetes, the circulation is commonly but not invariably in a state of excitement. The pulse is fuller and firmer, sometimes also more frequent than usual, and in general easily excitable; and this state is usually attended with headache and giddiness. Afterwards, as in other diseases, it becomes natural in frequency, softer and weaker, yet still easily excitable. The blood in the early stage occasionally presents more or less of the buffy coat, and the serum is whey-like, owing to the presence of fatty matter, derived probably from absorption of the fat. Subsequently the inflammatory appearance is much more seldom encountered, and the lactescent condition of the serum is likewise less distinct. No particular attention has yet been paid to the condition of the ordinary ingredients of the blood; but it is probable that, as in other chronic diseases, the colouring particles will be found to diminish in proportion as the disease advances. *Dr. Prout* found that the serum is of the average density of 1029·5, and contains the usual proportion of albumen and salts. Great interest has always been attached to the question, whether sugar exists in the blood; and this interest is enhanced by the recent discovery that sugar is formed in the alimentary canal. Most chemical inquirers have failed to detect sugar in the blood of diabetics; but as they have generally sought for it in substance, and the many natural ingredients of the blood obscure and modify its properties, the greater part of their inquiries, in so far as they lead to a negative result, are inconclusive. In recent times, the presence of sugar in the serum was indicated by *Ambrosiani* of Milan, and *Dr. Charles Maitland;* by the former of whom, crystals of pure sugar were separated in small quantity, by a complicated analysis, together with a larger proportion of fermentable, but uncrystallizable syrup. More lately still, these investigations have been confirmed by *Mr. Macgregor*, who, by coagulating and drying the serum, boiling it in water, and concentrating the decoction, obtained a syrupy fluid, which fermented strongly for several hours with yeast. These experiments would appear to put the question at rest. Yet it is probable, that sugar does not exist appreciably in the blood in all circumstances; for in the case where it was examined at the request of the writer by *Dr. Maitland*, although this principle was indicated in some measure by reagents, it could not be discovered by the only satisfactory inferential method of inquiry,—the process of fermentation. In a more recent case, in the early stage of the disease, the writer could not detect any sugar. In a third, when the disease was far advanced, fermentation indicated its presence only in the small proportion of one grain in eight ounces.

State of the cutaneous functions. The skin in diabetes mellitus is commonly dry, harsh, sometimes rough and disposed to scale, often liable to chilliness, and always with difficulty made to perspire, either by diaphoretic medicines or by exercise. There can be no question that transpiration is exceedingly defective. It is also probable that absorption is unusually active. At all events it is quite plain from what was said above, as to the liquid of the urine often for days together exceeding greatly the fluid part of the food and drink, that water must be freely absorbed, either by the skin, or by the pulmonary mucous membrane. The diabetic skin is always most characteristic in the advanced stage of the disease, or where it has been neglected in the early stage, so that the urine possesses the marked diabetic character. When the urine, under judicious treatment, has been brought somewhat towards its natural state, the skin invariably becomes softer and more easily perspirable.

State of the function of nutrition. In all cases nutrition is carried on imper-
fectly, and always the more so, the more the urine departs from the healthy
standard in quality and quantity.   Emaciation consequently takes place with
considerable rapidity ; and it will be found to correspond on the whole in a
given time with the excess of solids discharged by the urine over the solids con-
tained in the food and drink.   The progress of emaciation is on the whole con-
formable with the condition of the skin, and is consequently greatest where the
case has been for some time neglected, or is not influenced by treatment.   As
emaciation advances, the patient's strength is of course gradually much reduced ;
but there is likewise commonly much languor, weakness and disinclination to
exercise from the very first.   The mind is also for the most part affected, the
faculty of attention being impaired, and the disposition rendered melancholy,
anxious, irritable, and selfish.   No symptom undergoes more marked improve-
ment than the state of the mind under an amelioration in the condition of the
urine and skin.

Secondary disorders.   As saccharine diabetes commonly lasts for a great
length of time, there is room for the incidental occurrence of a considerable
variety of diseases.   Few of these, however, bear so close or so frequent a con-
nexion with the primary disorder as to be entitled to the name of secondary
diseases.   Peritoneal inflammation has been occasionally remarked in the early
stage.   In the advanced stage the most frequent of all incidental affections is
tubercular phthisis.   A considerable proportion of the cases that have died for
some years past in the Edinburgh Infirmary, have presented tubercles in the
lungs, and some have had the characteristic signs of consumption for a long
time before death.   Another affection, which has been observed too frequently
to be altogether accidental in its concurrence, is *granular degeneration* of the
kidneys.   It was formerly observed, that occasionally the urine in advanced
diabetes becomes distinctly albuminous ; and in two instances, which have oc-
curred in the Edinburgh hospital, and where an opportunity was presented of
examining the body after death, the kidneys were found more or less affected
with granular disorganization of their cortical, or even also in part of their
tubular structure.   A singularly interesting case of this complication occurred
very lately in the person of a man about fifty years of age, who came under
the writer's care in June 1838, and was afterwards under the charge of his
colleagues, *Dr. Graham* and *Dr. Traill.*   He was at this period reduced ex-
cessively by diabetes of two years' standing ; the urine was about six pints
daily, and varied in density between 1045 and 1055·4 ; the debility was
extreme, so as to confine him almost constantly to bed, and his death was there-
fore looked for daily.   In this state he lingered for two months, when the urine
began to show a distinct albuminous impregnation, and to fall in density.   In
the course of four or five weeks more it became natural in point of quantity,
strongly albuminous, 1010 in density, and entirely free of sweetness ; and in
this condition it continued till the middle of February, when the man died in the
most extreme state of emaciation, and simply of increasing exhaustion.   The
writer had an opportunity of examining the urine in January, and found it
wholly unfermentable by yeast.   On dissection, the kidneys were found larger
than natural, and about one half of their structure was destroyed by granular
deposition.   Another incidental disorder of not unfrequent occurrence, is *ana-
sarca.*   This affection has often been mentioned by authors.   It occurs chiefly in
advanced cases, and is not improbably connected with granular kidneys.   Under
any view of its origin it is a singular symptom to be found united with diuresis ;
for it may occur where the patient is passing eight or ten pints of urine daily.
This concurrence, however, is now well known to be a common enough fact in
cases of dropsy with granular disease of the kidneys.   Anasarca, occurring in
diabetes, is commonly difficult to remove, sometimes becomes excessive, and
seems occasionally the cause of death.   One of the most important of the affec-
tions, secondary to diabetes, is sudden fatal sinking, and exhaustion.   This affec-

tion may occur under any circumstances in the advanced stage, but has been most generally observed in connexion with an imprudent attempt on the part of the patient, to deprive himself for a time entirely or nearly of drink. In the advanced stage, the sudden forbearance from gratification of the thirst, if too long persevered in, is extremely apt to be followed by great and sudden reduction of the urine, swiftly increasing debility and faintness, a rapid, weak, fluttering pulse, restless expression of the countenance, and great anxiety. It is seldom found practicable to rouse the patient from this condition; and death generally follows in the course of a week. This affection is accompanied by sudden diminution of the urine to its natural quantity, restoration to its healthy density, and the disappearance of its sugar. While imminent danger attends any sudden injudicious restriction of the food, it would appear that excessive gratification of the appetite may prove not less hurtful. Sudden death has occasionally been observed soon after a too abundant meal. Apoplexy is a rare incidental affection in diabetes; but, according to *Dr. Prout*, is sometimes the immediate occasion of death.

Pathology, and Anatomical characters. The pathological anatomy and pathology of diabetes are still in a very unsatisfactory state. The kidneys are commonly found larger than in health, more flabby, more gorged with blood, and presenting more numerous and larger vessels, and enlargement of the uriniferous tubuli. The renal arteries and veins are also found at times enlarged. In general, no other morbid appearance is found in the kidneys; but in some cases there is an extensive deposition of grayish-yellow granular matter, invading their cortical and even also their tubular structure. In one instance, an extensive deposition of hydatids has been observed. When an attempt is made to investigate the state of the kidneys by injecting them, it has been merely remarked that the injection flows well, and that the injected vessels are numerous and large. The ureter is sometimes enlarged, generally also the bladder, and occasionally even the urethra; but not unfrequently there is no alteration in any of these organs from the healthy state. On the whole it may be concluded, that so far as anatomical information has yet been obtained, the urinary organs present, for the most part, no further change than what appears to indicate an increased demand merely upon their function. It is perhaps worthy of being added, that in a case which proved fatal in the first year through incidental peritonitis, the writer could find no unnatural appearance whatever in the urinary organs, except some increase of vascularity and of blood in the kidneys. In a few instances the kidneys, instead of being enlarged, are found contracted. Tubercles in the lungs are not uncommon; sometimes they are found softened, and even extensive cavities have been observed. The mesenteric glands have been at times seen considerably enlarged, but this is far from an invariable appearance. The stomach is often quite healthy, sometimes red, or its inner membrane also rough and thickened, as is often seen in old dyspeptic cases; and, not unfrequently, it is much enlarged. The liver, spleen, and pancreas are usually healthy. The intestines do not present any unusual appearance in the generality of cases.

It is plain, therefore, that pathological anatomy throws no positive light on the nature of this strange disease. Nevertheless it enables the pathologist to advance some steps in his inquiries.

In the first place it appears highly probable, from anatomical considerations alone, that the pathological source of diabetes is a functional, and not essentially an organic derangement. At least, no distinct derangement of structure has hitherto been pointed out even in a majority of instances. This conclusion derives no small support from the fact, that urine essentially diabetic will often become essentially natural for a few days before death. It is also supported by an analogous fact, though a solitary one of its kind,—an instance mentioned not long ago in a German journal, where, twice at least, if not thrice, during

pregnancy, the patient was suddenly attacked with saccharine diabetes, and as quickly recovered from it after delivery.

When an attempt is made to advance any further in investigating the nature of the disease, the inquirer is lost in the mazes of hypothesis, and harassed by the contradictory sentiments of pathologists. Some will insist, with *Dr. Mason Good*, that nothing else is required, or adequate, to account for the whole phenomena, except some peculiar irritation or functional disturbance of the kidneys. Others have vaguely ascribed the diseased state of the urine to some morbid condition of the blood. Others maintain that suppression of the cutaneous secretion is the fundamental derangement in the chain of pathological sequences. Others, and these the most numerous party, insist with great plausibility that the main disorder is derangement of the functions of the stomach. *Dobson*, *Home*, and *Rollo* are among the earliest advocates of this doctrine, which has also constituted a part of the most received theories of the present day, and which has derived a high degree of plausibility from the recent researches of *Mr. Macgregor*. All authors on diabetes agree that the alimentary functions are very often disturbed throughout its course. But if *Mr. Macgregor's* experimental researches be free of error or fallacy, it appears further to be established, that the primary derangement, hitherto ascertainable, is the formation of sugar in the stomach, instead of the ordinary chymous fluid which is free of that principle. *Mr. Macgregor*, as already mentioned, obtained a fermentable fluid from matters vomited not long after a meal, and crystals of sugar from the alvine discharges. He also remarked that the administration of yeast after a meal occasions great distension of the belly, and profuse eructation of gas; and in corroboration of the inference naturally arising from these facts, it may be added, that the further the diet of diabetics is removed from that which contains principles easily convertible into sugar, the less rapid is the progress of the disease, and the more does the urine tend to return towards its healthy constitution. Whether the formation of sugar in the stomach be the only essential and fundamental condition for the developement of diabetes, is a question which still remains to be answered, and is one obviously susceptible of experimental elucidation. It seems probable that nothing else is requisite for establishing the disease. There is no physiological reason why sugar formed in the alimentary canal should not be, in some measure, absorbed into the blood; and notwithstanding the negative results of many prior experimentalists, the late researches of *Ambrosiani*, *Maitland*, and *Macgregor* seem adequate to prove that it is positively present. Such being admitted to be the case, no further difficulty would exist in accounting for the peculiar condition of the urine, without the necessity of assuming the concurrence of some peculiar irritation or modification of the renal function. For the greater part of foreign substances admitted into the blood are well known to be promptly discharged from the body through means of the urine; and diabetic urine may be fairly considered as coming under this category. Formerly, indeed, it was held that sugar not only formed a part of the urine, but likewise displaced the urea; nay, some pains were taken to show how the one principle, from its organic constitution, becomes simply vicarious of the other by a new disposition of elements. But this difficulty vanishes, now that urea has been fully proved to exist at all events in a great majority of diabetics, and invariably in the early stage to an amount not inferior, nay often superior, to what is discharged with healthy urine. The urine of diabetes then, is substantially natural urine, *plus* so much sugar; and hence, if sugar be proved to be formed in the alimentary canal, and to exist in the blood, its discharge by the urine is analogous to the discharge of alkalis, iodine, and other substances through the same medium, when such articles are swallowed, and does not require the supposition, of any new or peculiar modification of the renal function. At furthest, the modification is nothing more than an adaptation to the state of the digestive functions and of

the blood, and one which, without a doubt, must promptly cease when the blood and the digestive functions return to their healthy condition.

These seem legitimate conclusions from the most recent researches in the chemical pathology of diabetes. They are so interesting, however, and practically so important, that it is very desirable to have the fundamental facts advanced by *Ambrosiani* and *Macgregor* tested by other inquirers and by frequent observation.

It is unnecessary to mention the other doctrines which have been propounded relative to the nature of this disease. They are founded mainly on theoretical considerations, have never received general currency, and do not lead to any practical deductions of interest.

Causes. Little is known of the causes of diabetes. In general it comes on so gradually, that the patient cannot refer it to any particular cause. Sometimes it is ascribed to exposure to cold, but in vague and general terms. In a few rare cases it has seemed to follow immediately some more definite exposure to cold and wet. It has been supposed to be connected with peculiar kinds of diet or modes of general living; and this way an explanation is given of its apparent frequency in some countries or districts compared with others. In the first place, however, the relative prevalence of diabetes in various localities is by no means accurately known. Little reliance can be placed upon the vague statements that have gone forth on this subject, such as, that it is more common in Scotland than in England, and in Britain than in France. Accurate statistical inquiries will alone determine the point; for the fallacy of such general assertions seems well enough proved by the late evidence adduced in the writings of *Bardsley* and others, that, contrary to what was at one time conceived, it is not less frequent in the great county hospitals of England, than it has been long known to be in the hospitals of Edinburgh and Glasgow. But further, even granting it were proved to be more common in certain countries and districts than in others, the difference has not been traced hitherto with any plausibility to peculiar modes of living, or kinds of diet. Every statement yet advanced on this head is loose and doubtful. In the observation of the writer, diabetes has presented itself under the most varying and opposite systems of diet. *Dr. Bardsley* found that some of his cases were referrible to the practice of frequently drinking cold water when the body was overheated. In some instances habitual intoxication, combined with frequent exposure, has appeared to be the active cause. There can be no doubt that constitutional circumstances, the result of hereditary tendency, have something to do with the origin of the disease. Various facts of this purport have been stated by *Prout, Store, Leigh, Thomas,* and others. *Dr. Prout* mentions an instance, where he had an opportunity of ascertaining that four near relatives of his patient had suffered from the disease; and an instance was not long ago mentioned to the writer, where a father and two of his family were affected, and there was reason to believe that at least one, probably two, individuals among his parents and grandparents, had likewise suffered from the same cause.

Prognosis. Very discordant statements have been made by the most trustworthy authors, respecting the mortality and prognosis in cases of diabetes. *Dr. Rollo* was among the first to insist that it might be cured, and has given in his work the whole particulars of a case where the patient seems clearly to have recovered. Since his time several statements have gone forth denying the success of the measures he recommended; very many failures have been announced; few successes can be boasted of; and, upon the whole, the general opinion may be safely assumed to be, that, although life is often much prolonged, and comfort greatly improved by treatment, a cure cannot be accomplished,—and that the disease sooner or later proves fatal.

When a case is neglected, and the patient indulges without restraint in what food and drink he craves, the disease advances with rapidity, and would probably prove fatal in no great number of months. Under proper treatment it is well ascer-

tained that life may be prolonged in general for several years. By many of the best authorities, however, among whom may be specially mentioned *Dr. Prout*, it is distinctly denied that the urine can ever be rendered completely and permanently natural in quantity and composition. In some instances the quantity is reduced to the natural standard, the density falls materially, the sweet taste is no longer observed, and the general symptoms become greatly less urgent. But still, either the urine continues fermentable with yeast, showing that sugar is present, or urea exists in preternatural proportion; in which state the diabetic characters ere long become again more characteristic, and the disease is at length fully re-established in defiance of unremitting careful treatment. In this respect the observation of the writer corresponds entirely with that of Prout and others. During the last twenty-one years he must have had occasion to know the particulars of at least sixty cases, treated in the Endinburgh Infirmary by himself or his colleagues; but, although some patients gained weight considerably, and had the urine reduced to two pints, to the density of 1030, to its natural colour and odour, and to its proper urinous taste entirely unmingled with sweetness, he has never known an instance of complete cure; in all, the proper diabetic characters of the urine recurred, and the malady ran its usual course.

Very different from these results are the conclusions drawn by *Dr. Bardsley* junior from his experience. For he mentions (*Cyclop.*, i. 536), that of twenty-nine diabetics he has had under his care, no fewer than eight recovered entirely. Although the statements of the latter author have not hitherto been confirmed by those of any other writer in recent times, still his observations, corroborated by a few successful cases in the hands of prior observers, and by the undoubted temporary benefit derived in most instances from judicious treatment, would appear to warrant the presumption that diabetes ought not to be despondingly considered, according to the practice of many, as an inevitably mortal disease. Recovery must here at least be considered as practicable; and an attempt will now, therefore, be made to lay down the circumstances which point out the chance of recovery as favourable or the reverse. When the disease has lasted for many months, when the patient is greatly emaciated, and broken down in mind as well as in body, when the urine is also very profuse and high in density, when the solids daily discharged by it considerably exceed the solids in the daily food, the chance even of amendment is small and recovery is impracticable. The most favourable cases are those where the disease does not exceed a few months in duration, where the urine, under moderate care in diet and regimen, does not ever exceed twelve pints in quantity and 1036 in density, where the emaciation is not very great, nor the appetite ravenous, nor the mind much depressed, nor the skin exceedingly dry and scaly. The favourable signs under methodical treatment are, that the urine quickly begins to sink in quantity without rising in density; that the daily discharge of solids by this excretion undergoes a steady diminution; that the emaciation is succeeded by a progressive increase of weight; that the appetite, and eventually also the thirst, are gradually lessened; and that the skin becomes softer, the eye brighter, the mind clearer and more cheerful, and the body active and stronger. A cure ought never to be considered as complete, unless for some weeks together the urine has been in every respect natural, and the patient is quickly regaining his natural weight; and the urine is not to be viewed as natural, unless it has its usual pale wine-yellow colour and urinous odour, does not ferment with yeast at a temperature of 70°, and contains little more than two ounces and a quarter of solid matter daily. The last character is a better criterion than its mere quantity or density, or even both taken together; but is of course to be determined from the density and quantity as data, according to the method already mentioned.

Among the signs indicating the approach of death, may be mentioned the accession of pectoral complaints, and the decided appearance of albumen in the urine,—symptoms which the patient seldom survives many months. Incidental inflammatory diseases are apt to be unusually fatal. The worst sign of all is

sudden and great prostration. When this occurs, even during a state of tolerable strength and activity, it is apt to lead speedily to a fatal issue; and it is almost always fatal in a few days, if it supervenes upon a rash attempt to reduce abruptly the allowance of drink.

Treatment. The treatment of diabetes is now well understood; and physicians are pretty well agreed as to its principles, though in practice they differ somewhat. It consists essentially in the employment of bloodletting, animal diet, opium, astringents, and the diaphoretic regimen.

Bloodletting forms more or less a part of the treatment employed by a great majority of practitioners in the present day; but it is now generally held to be serviceable only in the early stage, not in all cases even at this period, and only when used in moderation. By one eminent authority, *Dr. Watt*, bloodletting was pushed to a much greater extent, resorted to more indiscriminately, and elevated to a higher station among remedies. For he held that, mainly by the frequent abstraction of blood, for the purpose of reducing the quantity and stimulating quality of the circulating fluid, and by promoting this object by low diet, local remedies, and mercury, a cure might be brought about, not merely in the early stage, but likewise even where the disease had made great progress, and where the pulse had in consequence become feeble, as well as the general strength much impaired. In some rare cases these flattering commendations of *Watt's* treatment have apparently been realized by succeeding practitioners; but all the cases of alleged recovery, described by him and his imitators, are open to the objection that, at the time they were made public, practitioners were not aware of the exact conditions required for proving a cure, and that in all probability the urine continued essentially diabetic, although much improved. No one at least has been able to obtain the same results from the treatment by venesection in later years, since the lurking characters of the disease in such circumstances have been investigated and made known. And at present the employment of bloodletting is considered advisable only in the beginning, when the pulse is full and firm, if not also frequent, the anxiety and restlessness unusually great, and the skin inclined to become hot and always exceedingly dry. In this state of matters moderate bloodletting is found of signal service in allaying excitement and irritability; the attainment of which object is also for the most part attended with marked improvement in the quantity and nature of the urine.

Dr. Francis Home was the first to point out the advantages of an animal diet in the treatment of diabetes. But the dietetic treatment was not reduced to a regular system, or its effects thoroughly understood till the publication of the interesting treatise of *Dr. Rollo*. This author illustrated the beneficial effects of animal diet by a variety of cases, in one of which a complete and apparently permanent recovery was accomplished; and since his time, a diet more or less purely animal, has constituted an essential part of every successful method of cure. *Dr. Rollo* dwelt strongly on the necessity of enforcing for some time a strictly animal diet, into which no article of vegetable food was to be admitted. It has been found, however, exceedingly difficult to secure the observance of an absolute animal diet even in private practice and still more in hospitals; and in recent times it has even been maintained that the rigorous observance of such a diet is not essential, and that some articles of vegetable food, more especially bread, may be safely allowed in moderate proportion. The difficulty of enforcing a rigorous animal diet must be readily conceded; the craving for vegetable aliments soon becomes overpowering, particularly where the patient is tantalized by the sight of others indulging in them without control. But some doubt may be entertained whether the rigour of *Rollo's* dietetic system can be relaxed at all without prejudice, even although several eminent authorities, and among the rest *Dr. Prout*, have decided the question in the affirmative. It is at least not unworthy of remark, that those who allow a moderate proportion of vegetable aliment admit their practice to have been unsuccessful; while others, who maintain with *Dr. Bardsley* that a fair proportion of cases may be cured,

have adopted in their practice a rigorous animal diet, and insist, like *Rollo*, that they who deny from their own experience the curability of the disease, had forfeited all claim to do so from having permitted a departure from his injunctions in this respect.

It is universally conceded that if vegetable food is to be allowed at all, bread is the only admissible article ; that it should be fermented bread, and somewhat stale.   Among animal articles the flesh of adult animals is preferable to others ; it ought to be cooked in preference by broiling or roasting, and with as little salt as possible lest thirst be excited ; it should be taken three times a day at most, the largest meal being that of dinner ; and the last meal must be taken at least two or three hours before bedtime.   In the middle walks of society a greater variety of articles and modes of cooking is advisable, otherwise an animal diet soon becomes irksome ; but in admitting variety in these respects, digestibility is always an important condition.   *Rollo* and some of his imitators have thought that there is advantage in the meat being as fat as possible, because it is less digestible than in its ordinary state.   But the reason for this preference is far from conclusive, and experience has not confirmed the statement, that much fat tends to restore the healthy constitution of the urine.   Others again have thought that cheese may form a moderate proportion of the food, on the ground that in a state of health it is comparatively indigestible, superabundant in azote, and highly productive of urea and lithic acid.   Here too ulterior experience contradicts early theory.   The stomach being apt in many cases to be easily disordered, indigestible substances ought not to be preferred ; as the urine generally abounds in urea, food producing this principle in abundance is not eligible ; and in point of fact cheese, even where well digested, does not appear to possess any advantages over muscular fibre.   It ought not therefore to constitute a large proportion of the food as some propose, but may be allowed in small quantity for variety's sake, wherever it is found easily digestible.   The quantity of the food should be carefully regulated.   It was remarked above, that exaggerated notions are often entertained of the quantity of food which diabetics consume, and that in general, though they have unusual appetite and craving before meals, they will be satisfied with even less than the allowances of a stout man engaged in active employment.   If bread is allowed, sixteen ounces of that article, and twenty ounces of meat (weighed raw) will generally prove sufficient ; or it will become so in no long time if the morbid condition of the urine should begin to yield to treatment.

As thirst is commonly a more urgent symptom than hunger, so is it likewise more difficult to control.   The regulation of the drink is, however, one of the most essential articles of the treatment.   For it must be observed that excessive indulgence in liquids is on the one hand injurious by impairing digestion, or even causing some of the food to pass into the intestines undigested ; and on the other it has a much worse effect upon the urine than merely increasing its quantity by simple dilution, since the density is commonly found to be maintained, though the quantity be greatly increased.   The patient must accordingly be often exhorted to curb the longing for drink as much as possible and great care should be taken in regulating its quality.   It is found that thirst is slaked with a less amount of fluids when a considerable proportion of the drink consists of such animal infusions as weak beef tea or mutton tea, to which may also be added milk in moderation.   Except these articles, pure spring-water and probably also such waters as contain calcareous salts in excess, no other ordinary articles of drink are allowable.   The water of Bristol Hot-well and other calcareous springs, has been found by *Dr. Marsh*, *Dr. Prout*, and others, to be less apt to increase the quantity of urine than ordinary waters.   Beer and other fermented liquors, much as they are longed for by the patient,—also wine and spirits, which he often asks for on account of the sense of languor and oppression that assail him,—tea as being in some measure diuretic, and all acidulous drinks, must be carefully shunned.   An important rule is, that he should drink little at

a time. Another rule not less essential is, that little liquid should be taken at meals, and the thirst controlled as long after meals as possible ; because under these precautions digestion goes on more perfectly, and thirst subsequently is less difficult to appease. Advantage has been found by some in using all the drink warm, because less is required to slake thirst. While it is desirable that the desire for drink should at all times be controlled as much as may be conveniently accomplished, great and sudden reductions, for reasons formerly given, ought never to be attempted, especially when the disease is somewhat advanced.

It is of imperative consequence that violations of system as to diet be scrupulously avoided. The undue gratification of the thirst, the indulgence in such prohibited articles as beer, spirits, vegetables, pastry or confectionaries, is infallibly followed by an increase in the quantity and density of the urine, when it has been reduced in these respects by previous care in eating and drinking ; and one stolen enjoyment is dearly purchased by many days of aggravated thirst and exasperation of every symptom.

Some have been inclined to trust the treatment of diabetes to animal diet almost alone. More generally opium has been considered an important adjunct, and it would seem to be indicated by the anxiety, peevishness, and general irritability of the system, which prevail in most cases, and invariably where the disease has been for some time neglected. The regular administration of opium in the dose of a grain twice or thrice a day, and gradually increased so as to keep up a calmative and gently hypnotic action, constitutes a part of the most successful methods of treatment which are followed in the present day ; and in particular it forms an essential part of the method by which *Dr. Bardsley* junior attained the extraordinary success formerly alluded to. Where opium is thus given habitually, its constipating effect on the bowels must of course be counteracted by laxatives ; which besides are often called for by a natural tendency existing to constipation.

Astringents have been admitted as part of the treatment of diabetes from a very ancient date ; but their utility is doubtful, and their administration proceeds upon a false theory, if the disordered state of the function of the kidneys be a secondary affection, as seems not improbable. Till recent times vegetable astringents were made use of; but of late such mineral astringents as sulphate of zinc and acetate of lead have been preferred, and the latter constitutes one of the means now generally considered most efficacious.

The restoration of the functions of the skin to their natural condition has been a favourite object with many physicians, and is admitted by all to be of no little consequence. It may be questioned, however, whether the administration of medicines internally for this purpose be a judicious measure, or at least whether any other internal diaphoretic be advisable, except the opium, which is administered primarily for another object. Some give the opium in the form of Dover's powder. It is probably preferable to give the opium simply, and to trust the restoration of the cutaneous excretion to friction, warm clothing, and the warm bath. The last article of regimen is usually most grateful to the patient, and when used in moderation in the evening is followed by refreshing sleep, sometimes gentle perspiration, and also not frequently by comparative freedom from micturition during the night. The employment of antimonial sudorifics, which has been advocated by some, and especially by *Dr. Marsh*, has never come into general credit.

Besides the fundamental treatment now described, various subsidiary or incidental measures require brief mention. The concurrence of dyspeptic symptoms may render it necessary to administer magnesia as an antacid, and the aromatic bitters as tonics. Pain in the epigastrium, sometimes a troublesome affection, is often best relieved by a few leeches. The supervention of œdema is to be met by sudorifics or the purgative method. Pulmonary affections must be combated by calmative expectorants and local bleeding or blisters. The occurrence of great debility and exhaustion may render the employment of

wine and other stimulants unavoidable. But this class of remedies ought not to be resorted to so long as any chance of recovery seems to remain.

It would serve no useful purpose to examine into the merits of the farrago of heterogeneous remedies which have been proposed by various authors more or less as specifics in diabetes. The mere enumeration of them will be sufficient. Some have trusted to local treatment by leeches, blisters, and issues applied to the loins. Others have proposed alkalis, especially ammonia ; some on the contrary prefer acids ; and some magnesia. Tonics, among which cinchona chiefly figures, were at one time rather fashionable. Mercury has been considered an important remedy, by those chiefly however who look upon it as a remedy for almost every thing. Iron has had its supporters also. Even diuretics have had their day with some. Among the many new remedies which modern chemical discovery has introduced into the Pharmacopœia, iodine was for some time thought a sovereign remedy. And more lately creosote was vehemently extolled as constituting at length the specific which had been long unsuccessfully sought for. It would be unfair to deny that some of these modes of cure have appeared occasionally of service. But as they have commonly been conjoined with an animal regimen, there is no evidence whatever of any of them possessing a specific virtue. Neither have they been hitherto found so frequently successful as to induce any great reliance upon them even as subsidiary measures in the treatment.

DIABETES CHYLOSUS.

Symptoms.—Nature.—Treatment.

UNDER the name of chylous urine, *Dr. Prout* first gave an accurate description of a peculiar diseased condition of this fluid, where it is discharged of a milky appearance, and contains principles analogous if not identical, with those of chyle. *Dr. Willis*, waiving the question of its relations to chyle, denominates it oleo-albuminous urine, and *Dr. Venables* classes it with the various forms of diabetes under the specific name of Diuresis chylosa.

This is a rare disease, even *Dr. Prout* having only had nine cases brought more or less directly under his notice. Several detached examples of it, however, have been made public since *Dr. Prout's* work on urinary disorders appeared, so that some notice of it is required in the present place. It sometimes exists without any derangement of the health, at other times with some degree of languor and reduction of flesh, sometimes again with lumbar pains, much emaciation, strong appetite, and much thirst, so as to bear a close resemblance in its general characters to saccharine diabetes. The urine is for the most part abundant in quantity ; sometimes, however, natural in that respect, of a milky appearance, and varying in density from 1010 to 1020 in the generality of cases. After it has been discharged for a short time it sometimes coagulates into a gelatinous body like blanc-mange, and afterwards gradually separates into a clear yellowish fluid and a white clot ; at other times a white flaky matter is deposited without general coagulation of the mass ; and in other cases again, a white homogeneous substance is thrown up to the surface like cream. The matter which separates in all these shapes appears to differ somewhat from albumen, to approach to fibrin or casein in its characters, and to contain some oleaginous or fatty matter which may be easily removed by sulphuric ether. In all of these properties it bears a resemblance to the white coagulum of chyle ; which it has accordingly been supposed to be. The entire fluid is sometimes coagulable by heat, sometimes not, always coagulable by acids, and easily decomposed by keeping. The clear fluid, after separation of the coagulum, some-

times coagulates by heat, and yields a precipitate with solution of ferrocyanide of potassium, acidulated with acetic acid ; by which property it is distinguished from true albuminous urine. Occasionally the white coagulum contains in its substance some of the colouring particles of the blood. The urea is always very defective, but never altogether wanting. The peculiarities of this kind of urine are usually best marked a few hours after a meal. They are apt to be removed for the time by inflammatory action, or by pytalism from mercurials.

This singular condition of the urine has been observed sometimes to occur only at intervals, and is then attended with the general symptoms mentioned above. In other cases it has seemed permanent, at least has been traced for five or even for twelve continuous years ; and it is then generally so little apt to give rise to constitutional derangement, that the individual, as in a case mentioned by *Mr. Abernethy*, may even become corpulent, or may bear children without apparent injury, as in one of the instances described by *Dr. Prout*. It has been met with in both sexes, and before puberty, as well as in early manhood, middle life, and old age. A considerable proportion of cases have occurred in the instance of individuals who had been a good deal in hot climates. Its causes are exceedingly obscure. Luxurious living, exposure to cold, extreme fatigue, and the constitutional action of mercury, have been the chief apparent causes mentioned by the reporters of cases. It appears to be common in Brazil.

The *nature* of the disease is not well determined. The majority of authors have referred it to the passage of chyle into the urine, and therefore suppose that a portion of the chyle does not undergo the final stage of the process of sanguification on being thrown into the bloodvessels ; that the blood becomes chylous ; and that the morbid ingredients are thrown off by the kidneys, like many other foreign matters. Plausible as this view may seem, it has not yet received that support from observation which will alone establish it : no one has yet proved that the blood is chylous. The condition of the urine is certainly very like that of the blood in cases of milky serum, where a modified albumen and a great abundance of fatty matter are present ; but, strange to say, although blood has been several times drawn in the disease, no one has hitherto taken any notice of its appearance or properties. In the account of a case described by *Dr. Graves*, the coagulable matter is said to have been casein ; which, if correct and of general occurrence, would lead to a different view of the nature of the affection. But the secretion of cheesy matter with the urine in any circumstance is a very doubtful fact.

In the only cases where a fatal termination has been observed, death arose incidentally from acute internal inflammation ; and no morbid appearance was discovered in the kidneys.

Chylous diabetes seldom calls for any particular *treatment*. When there is constitutional disturbance, it has been found useful to withdraw blood from the arm, to enjoin sparing living, to promote the functions of the skin, and to administer anodynes and regular laxatives, among which the resinous kind probably are the most appropriate. Tonics do not answer well. Where the disease is habitual and without constitutional disturbance, it ought not to be interfered with. At all events no means of removing it are known.

SUPPRESSION OF URINE.

Symptomatic of various diseases—Symptoms.—Causes.—Treatment.

By suppression of urine, the *Ischuria renales* of most nosographists, and more aptly designated by *Dr. Willis*, *Anuria*, is understood the diminution or complete arrestment of the secretion of urine. Although usually considered by

practitioners and described in systematic works as a disease, it is probably in correct language a mere symptom of various diseases. It occurs as a symptom in some cases of acute as well as chronic nephritis, in the acute and chronic forms of granular deposition into the substance of the kidneys, as well as in atrophy and other chronic renal diseases. It also occurs as a symptom of certain forms of poisoning, probably in connexion with inflammation. Doubts exist whether it is also presented as a mere functional disorder. In compliance with custom, suppression will be here shortly described as an express disease.

The urine may, for a time or permanently, be much reduced below the daily average of thirty-five or forty ounces, formerly assigned as the average of health, without any ill consequence resulting. A temporary diminution to only six or eight ounces daily is common enough in febrile diseases, without any peculiar symptoms being observed to follow. Even in a state of health an unusually dry diet, especially conjoined with much exercise, and likewise, certain obscure constitutional peculiarities, may occasion a very material reduction, but still, as in the former case, without any evident inconvenience. We even sometimes see a permanent decrease far below the natural standard occasioned by constitutional circumstances alone without any injurious effects. The writer lately met with the case of a youth of seventeen years of age, who for two years before had passed never more than six ounces, and for the most part only four ounces daily; yet, except several attacks of loss of appetite and consequent languor and weakness, of short standing, he suffered no inconvenience. In some diseased states of the system the same immunity from any peculiar symptoms has been remarked, where the urine was almost entirely suppressed for many days together. As to the alleged cases, where the secretion of urine appeared to have been suspended for weeks, months, or even years, in persons enjoying tolerable health, or at all events not subject to any affections referrible to inaction of the kidneys, they may be all safely put down to the account of imposition.

Admitting that exceptions occasionally occur, there can be no doubt of the general fact, that extreme diminution or complete suspension of the flow of urine is usually followed by very serious symptoms, and generally by death at no great distance of time. The symptoms vary with the circumstances under which the suppression takes place, and probably with its causes ; which however are not yet all thoroughly understood. When suppression takes place suddenly from any cause during a state of health, or in any other circumstance except a pre-existing state of protracted chronic disease, the usual results are the following :—At first little or no uneasiness of any kind is occasioned ; but ere long there is languor, restlessness, vague general discomfort, a sense of weight, weariness, and sometimes pain in the loins and lower extremities, upon which the attention is probably for the first time called to an excessive diminution or total suspension of the urine. The pulse then commonly becomes excited, and sometimes regular fever is formed, with heat of skin, flushed features, headache, nausea, and vomiting ; but these symptoms are not constant. So far the case presents a resemblance to the early stage of continued fever ; for which the disease is at first not unfrequently mistaken. At length drowsiness comes on, generally in the course of the third day ; and about the same period, or sooner, puffiness of the features is observed, or at times distinct œdema of the limbs or body generally, sometimes pitting on pressure, more frequently elastic. The drowsiness gradually passes on to coma, which is usually formed on the fourth day ; and death ensues, either within three days more, and without any additional symptom, or at an early period of the coma with a precursory stage of convulsions. When the bladder is examined with the catheter, which is commonly done from curiosity, or to guard against the possibility of mere retention of urine existing, the instrument brings away at the commencement only a few drachms of muddy urine, loaded with mucus, commonly pale,

low in density, and often strongly coagulable by heat as well as nitric acid. At a later period the bladder is generally found quite empty.

When suppression of urine takes place suddenly during the prevalence of chronic diseases, the symptoms are for the most part identical with those just described. But if the flow of urine fall gradually, it is sometimes observed that that the quantity may be reduced to one or two ounces daily of a fluid containing not above a third of the ordinary proportion of solids, and nevertheless without the patient presenting for many days any of the consequences usually expected from so great a suppression. Such is not unfrequently found to be the case in the advanced stage of granular degeneration of the kidneys. The symptoms which at length appear are those of unmixed coma, without fever or any excitement of the circulation at all, and likewise without distinct convulsions; and death creeps on by degrees from increasing stupor, very much as in poisoning with opium, but more slowly; or the fatal event is occasioned by some accessary affection prevailing at the time the suppression was induced.

Another remarkable circumstance in which suppression of urine may take place with very different phenomena, is in connexion with the effects of certain poisons. Complete suppression has been observed in cases of acute poisoning with large doses of foxglove, corrosive sublimate, and cantharides. But here the kidneys are evidently in a state of violent irritation, as appears both from the lumbar pain, strangury, and often bloody urine at the commencement, and from the redness, softening, gorging, and occasionally even suppuration, which are found in their substance after death. All cases of this kind, hitherto recorded, seem to have proved fatal from the accessary effects of the poison on the alimentary canal or nervous system, at a period too soon for the developement of the constitutional symptoms proper to suppression.

In such cases the suppression of urine is probably not a functional disorder, but merely one of the secondary effects of inflammation. It is well known at least, on the one hand, that these poisons produce nephritis, and on the other that nephritis, if acute, whatsoever its cause, whether exposure to cold, a blow upon the loins, or irritation of the kidneys arising from diseases of the prostate, bladder, and uterus, or from calculi in the kidneys, or from calculi or other obstructions in the ureters, is often attended with complete arrestment of the urinary secretion.

There is still another variety of suppression worthy of distinct mention, on account of the peculiar circumstances in which it has been witnessed, namely, a form lately described by a German author, *Schönlein*, and likewise shortly noticed by *Dr. Willis* as a disorder that has occasionally come under his observation. Sometimes in young children the flow of urine is diminished to a very great degree, or almost entirely suspended, so that only a few drops are passed from time to time and with difficulty; and this state is accompanied with a febrile state of the general system, pain in the region of the bladder, scalding of the urethra and external parts over which the urine dribbles, constipation and scybalous fæces, an acetous odour of the breath, and a tendency to pustular eruptions and intertrigo of the cuticular folds. If not arrested, the disease ends in exhaustion and coma. A similar disorder has been observed in elderly persons, especially in connexion with lithic gravel. *Dr. Willis* infers from his experience, that this variety of suppression occurs chiefly as the sequela of confirmed diseases of the digestive organs or nervous system; and it may be safely added, that many cases of the kind are in all probability nothing else than the concluding stage of chronic derangements of the structure of the kidneys, especially granular degeneration and atrophy, to which the most manifest affections, those of digestion and of the nervous system, are merely secondary.

The *causes* of suppression of urine are various and not yet well understood; but the researches of *Dr. Bright* and his followers have done a great deal towards elucidating the subject, by pointing out that suppression is very often closely connected with pre-existing organic disease in the kidneys. The imme-

diate exciting cause has sometimes been a blow, producing concussion of the parts adjacent to the kidneys, at other times general exposure of the body, or exposure of the lower part of the trunk to cold and wet, and in some instances the action of poison taken inwardly. In such cases suppression appears to be commonly induced secondarily through the intervention of acute nephritis. But more generally it is difficult to fix upon any probable extraneous cause; and it is only after an examination of the dead body, or under an exact acquaintance with the varying characters assumed during life by chronic renal diseases, that the true relations of the most prominent disorder, the suppression of urine, become intelligible. If the writer may judge from his own observation, suppression occurs very seldom except in the course of acute and chronic organic diseases of the kidneys.

The morbid appearances in acute anuria, or sudden suppression without obvious pre-existing disease, are darkness, flabbiness, brittleness, and congestion of the kidneys, sometimes with enlargement, especially of their cortical portion, contraction and emptiness of the bladder, and impregnation of the blood with urea, which may also be detected in the blood drawn during life. In suppression connected with the action of poisons, unequivocal marks of inflammation are sometimes found, namely, redness of the lining membrane of the pelvis, and calyces of the kidneys, purulent matter in the tubuli, which may be squeezed out of the papillæ, and occasionally even a collection of pus in the pelvis. In the chronic form of anuria, which occurs suddenly or gradually in the progress of chronic diseases, it is usual to find the kidneys very much altered in their structure, and their healthy organization in a great measure destroyed. Probably various organic diseases of the kidney may terminate in suppression of urine; but those most frequently found in connexion with it are the several forms of disease which have been classed under the general head of granular degeneration. There is strong reason for suspecting that some cases of acute anuria are likewise connected with the same disorder, the suppression arising in the early stage of that functional derangement which gives occasion to albuminous urine and granular deposition. Other cases of acute anuria are rather referrible to the acute form of simple nephritis. In some instances the apparent renal affection causing suppression has been the presence of one or more calculi in the kidneys, or one of the ureters. But judging from the descriptions of published cases of this nature, it is not improbable that other chronic disorders of structure concurred. This was clearly the case in one of the cases quoted by *Dr. Willis.*

The *treatment* of suppression of urine differs with the circumstances in which the disease arises. In most cases it is fatal, and not even to be interrupted in its progress by any method of cure, especially when the suppression is complete, or nearly so. When the urine is merely much diminished, as in many instances of chronic organic diseases of the kidneys, diuretics, among which digitalis and bitartrate of potash are the most active, will sometimes restore the natural quantity of urine, and avert danger for a time. But when the urine is reduced to a few drachms in the twenty-four hours, or is altogether suspended, recovery is exceedingly rare. In cases occurring without previous organic disease, the most efficacious remedies are free bloodletting, anodynes combined with diaphoretics, such as Dover's powder, the warm-bath purgatives, together with frequent brisk purgative injections; to which some add, though with questionable propriety, blisters to the loins and diuretics. In cases where the kidneys have been long diseased, blood should be withdrawn sparingly, because it is always very thin, watery, and unusually defective in colouring globules, so that the constitution cannot safely bear further loss. Purgatives and diuretics are here the most advisable remedies, and blisters too are sometimes of service. For the most part, however, when the urine has become nearly suppressed in long-continued organic diseases of the kidneys, no remedial measures will restore its quantity; and if once drowsiness has fairly set in, the case is all but

hopeless. In the coma, which constitutes the final stage of suppression, no remedies are of much avail; bloodletting, which may seem indicated by the state of the circulation, does no good, and sometimes evidently accelerates death.

ORGANIC DISEASES OF THE KIDNEYS.

Few organs in the body are subject to so great a variety of morbid alterations of structure as the kidney. Most of them, however, are of rare occurrence; and those which are frequent have been discovered to be so only within a few years. Hence the knowledge at present possessed of their anatomical characters, and still more of their external signs during life is in many particulars imperfect. To *Dr. Bright* particularly belongs the honour of pointing out a few years ago the frequency with which the kidneys undergo changes in their organic structure, as well as the important part performed by these structural changes in the developement of several common and fatal disorders. More recently the entire subject of renal diseases has been taken up by *M. Rayer;** whose investigations, not yet concluded, promise to throw much additional light upon the rarer organic affections.

The general result of these and other inquiries is, that the kidneys are more or less liable to all the alterations of structure which are observed in the great viscera generally, and to certain peculiar affections which bear reference to their peculiar functions. They are subject to inflammation, chronic and acute, parenchymatous and membranous; and they also present hypertrophy and atrophy of their proper structure,—congestion and anæmia,—tubercular, granular, cartilaginous, and carcinomatous deposition and degeneration,—serous cysts, osseous cysts, urinary cysts, and general distension from obstruction to the escape of urine,—together with displacement, anomalous conformation, and deficiency of a kidney. Of the pathological conditions now enumerated, two only are so frequent as to require full investigation here,—namely, inflammation and granular deposition. As for the rest, besides being rare, they are rather objects of anatomical interest than of practical importance; for the signs by which they may be detected during life are equivocal, and in their very nature they are little amenable to treatment.

The whole subject of organic diseases of the kidney may be conveniently treated in a practical work like the present under the following heads :—1. *Errors of position or conformation ;* 2. *Hypertrophy ;* 3. *Inflammation ;* 4. *Granular deposition ;* 5. *Hyperæmia ;* 6. *Anæmia ;* 7. *Atrophy ;* 8. *Tubercles ;* 9. *Carcinoma ;* 10. *Hydronephrosis ;* 11. *Serous cysts.*

ERRORS IN POSITION AND CONFORMATION.

Instead of being situated in the lumbar region, one of the kidneys is sometimes placed in the iliac fossa or pelvis. *Rayer* says he has detected this malformation during life, both by remarking the tumour in the iliac fossa, and likewise by feeling that the kidney was absent from its usual place, on making the patient lean forward on his knees and shoulders in bed, and then grasping the loins. Sometimes the two kidneys are connected together by renal structure across the spine, constituting what is aptly called the horse-shoe kidney. More frequently one kidney is altogether wanting. This malformation is probably not

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* Traité des Maladies des Reins.

so common as has been sometimes generally thought, because excessive atrophy of the kidney has been sometimes mistaken for the total absence of the organ. When absent, the ureter is commonly wanting also; but sometimes, as in a case lately examined by the writer, the ureter is present and terminates in the usual region by simple occlusion of its tube. Deficiency of a kidney may be sometimes ascertained presumptively by the method of examination just described as proposed by *M. Rayer*. Malposition, malformation, or deficiency of the kidney, does not give rise to any disturbance of the renal functions or to any inconvenience. These deviations from the ordinary rule are therefore mere anatomical curiosities. When one kidney is wanting, its place is always supplied by unusual size or hypertrophy of the other.

HYPERTROPHY OF THE KIDNEYS.

The case just mentioned is the clearest example of simple hypertrophy of the kidney; the organ is simply enlarged in all its parts. In other circumstances, however, both kidneys are affected with hypertrophy in conjunction with other morbid states. Thus, in cases of saccharine diabetes, it is not uncommon to find the kidneys considerably enlarged, and their proper structure unusually developed. But there is always in that case congestion also, which in part accounts for the apparent developement. Again, in that state of the kidneys which many pathologists regard as the first stage of the acute form of granular deposition, it is usual to find the kidneys enlarged, and the tubular as well as cortical structures unnaturally developed. But here, too, congestion is constantly present, and likewise frequently some degree of granular deposit, by which the developement of the cortical structure in particular is to appearance much increased, though the augmentation may really be inconsiderable. Little is known of the relations of renal hypertrophy to symptoms. Most probably it either gives rise to no peculiar symptoms, or, as in diabetes, it is consecutive not primary, and nothing else than the result of an increased demand upon the renal functions. That it has nothing to do with the developement of diabetes is plain from the fact, that it is far from being invariably met with in that disease, even where of long standing.

INFLAMMATION OF THE KIDNEYS.

Frequency of the disease.—Various forms according to Rayer.—Symptoms of acute nephritis. —Of simple chronic nephritis.—Complications.—Symptoms and terminations of Pyelitis.— Causes of the several forms of inflammation of the kidneys.—Anatomical characters.— Prognosis.—Treatment.

INFLAMMATION of the kidneys has been commonly thought to be a rather rare disease; but if the late investigations of *M. Rayer* be correct, and all the affections he has included under the head of inflammation belong to that category, it would appear to be one of the most frequent of all organic disorders. Doubts may be justly entertained, whether the use he has made of the term inflammation be not too comprehensive; but, at the same time, there can be little question that inflammation of the kidneys has been proved by him to be much more common than has hitherto been almost universally thought. In particular, it appears often to concur with other diseases either of the urinary organs or elsewhere, by whose symptoms it is obscured during life, and by whose appearances after death the attention of the pathologist is apt to be led away from it.

Inflammation may attack each of the principal textures of the kidney either

separately or conjunctly; and in each case it may put on a variety of forms as regards both its anatomical characters and its external signs.   *M. Rayer* has distinguished no fewer than four diseases according to the texture involved, namely *Nephritis*, or inflammation of the gland itself; *Pyelitis*, inflammation of the pelvis and calyces; *Perinephritis*, inflammation of its investing fibrous membrane; and *Pyelonephritis*, where both the pelvis and glandular structure are affected.   Of nephritis he admits no fewer than four different species :— *Simple*, of which there is both an acute and chronic form; *Arthritic*, comprising the peculiarities which occur in connexion with gout and rheumatism; *Albuminous*, under which designation is comprehended the granular alteration of the kidneys of *Dr. Bright;* and *Nephritis from morbid poisons* such as attends typhoid fever, small-pox, and other infectious or malignant febrile diseases.   Of pyelitis *M. Rayer* also makes four species, *simple, gonorrhœal, calculous,* and *verminous;* which differ from one another chiefly in their causes. All these species and modifications of disease, are to be distinguished as well by anatomical characters as by their history, and their special symptoms during life.   In the following statements it is impracticable to do full justice to his views, or to follow his arrangement, because the text intended to illustrate his pathological delineations is hitherto only in part published.   An attempt, however, will be made to introduce the most material part of what has already appeared under one general head of INFLAMMATION OF THE KIDNEYS. All that relates to granular deposition will come better under a separate head; for the connexion of that disease with inflammation has not been established.

Symptoms.   The symptoms of inflammation of the kidneys differ considerably according to the acuteness of the disease, the texture attacked, and the cause which produces it.

1. *Simple acute Nephritis.*   This form of the disease commonly sets in, like other acute inflammations, with an attack of rigors, often very severe, followed soon by sickness, heat of skin, frequency of the pulse, and other symptoms of fever.   At the same time there is pain in one or both loins, deep-seated, at times circumscribed, more generally affecting the whole lumbar region and flank, not pulsating, occasionally acute, more frequently dull, sometimes felt only upon pressure in the region of the kidney, always aggravated by firm pressure, and likewise by the sitting posture, bending forward, coughing, sneezing, or other strong efforts of respiration, and even sometimes by the descent of the diaphragm in ordinary breathing.   The lumbar pain is particularly acute in the arthritic variety of the disease.   The pain is not always confined to the lumbar region; but more commonly it shoots down the course of the ureters to the neck of the bladder, the groins, or the scrotum, and it is frequently attended with retraction of the testicles.   When the patient is made to lie in bed upon his face, with the knees drawn up under the abdomen, the kidney may sometimes be felt by grasping the flank with one hand or between both hands; in which case it is found to be tender, and occasionally too enlarged.   The urine is either suppressed altogether, or more commonly it is very scanty, and passed either seldom, or on the contrary, very often, and with straining and severe pain.   The fluid discharged is usually bloody, that is, either attended with considerable hæmaturia, or more often tinted merely of a cherry-red or brown colour, and coagulable with heat and acids.   Afterwards the blood disappears, and the urine is pale, almost aqueous, without albumen, and hence not coagulable by heat, no longer acid, but either neutral or even alkaline, especially where the bladder or prostate is also affected, or where the inflammatory action in the kidney tends to the chronic form.   Albumen is sometimes present, although there is no impregnation of blood, so that the urine coagulates with heat as in cases of granular degeneration.   This is particularly observed, according to *Rayer*, in the rheumatic form of nephritis.   But where the albuminous impregnation is considerable, granular deposition probably always concurs.   Lithic acid and the lithates are usually defective in their proportion; in the arthritic

variety alone of nephritis are they, on the contrary, superabundant, so as to come away in the form of sandy or earthy gravel, or to be deposited in these forms as the urine cools; and in correspondence with this state, the urine, instead of being pale and neutral or alkaline, is acid, and often high-coloured. In pure nephritis it does not contain either mucus or pus. But as the disease seldom continues long, without being attended with inflammation of the pelvis, ureters, or bladder, it is in fact usual to observe first mucus, and then purulent matter passing with the urine.

The ordinary constitutional symptoms, besides the simple phenomena of general reaction, are a foul, greatly loaded, white tongue; distressing nausea, and frequent vomiting, generally of a muco-bilious matter, which at times possesses a somewhat urinous odour; constipation, tympanitic distension of the abdomen, and wandering pains in the intestines; together with an anxious countenance and much depression.

Ere long further symptoms arise, which are connected with the several modes of termination of the disease. Sometimes indeed the inflammation terminates in resolution, without any new symptoms. At other times it would appear to terminate in partial induration of the inflamed kidney. In that case there are either no symptoms afterwards, but simply the phenomena of resolution; or, where the extent of injury produced is great, obscure indications of chronic organic disease may ensue, leading generally to chronic nephritis. The most remarkable termination of the disease is in apoplectic coma. This is very apt to occur where the urine is long greatly diminished or altogether suppressed. Drowsiness then comes on, which gradually ends in deep coma, occasionally intermingled with convulsions; and death usually ensues within three or four days after the first appearance of cerebral symptoms. Allied to this mode of termination are another set of cases where typhoid symptoms appear at an early period,—namely, prostration of strength, torpor of the senses and mental faculties, frequent rigors, a black incrustation of the tongue and teeth, together with an absence of pain except on pressure in the loins, and the involuntary discharge of a little urine at distant intervals. Such cases too end in coma. Another mode of termination is in suppuration. This is indicated, though obscurely, by rigors followed by hectic fever, but not necessarily, as some imagine, by the appearance of purulent matter in the urine,— which is rare indeed, except where the pelvis, or membranes of other urinary organs, are also inflamed. Suppuration sometimes leads eventually to renal fistulæ, which may communicate either with the cellular tissue of the lumbar muscles, causing abscess there and even an external opening on the integuments; or with the liver, exciting hepatic abscess; or with the peritoneal cavity, giving rise to fatal acute peritonitis; or with the colon or duodenum, through means of which the contents of the renal abscess are discharged by the rectum. Renal fistulæ however, with these their several results, are extremely rare, except where pyelitis, or inflammation of the pelvis, is united with inflammation of the proper renal structure. Gangrene is a still more rare termination of nephritis. It is rare in any circumstances, and chiefly occurs where the pelvis is inflamed as well as the secreting structure. It is most frequently observed in the pyelo-nephritis, which terminates calculus of the kidney or bladder, or which follows the operation of lithotomy. Its occurrence is indicated by sudden remission of pain, a feeble fluttering pulse, constant vomiting and hiccup, anxiety, delirium, complete suppression or a scanty discharge of brown fetid urine; sometimes by petechiæ on the skin, and the other symptoms of malignant typhus. Among the terminations of acute nephritis must also be mentioned chronic inflammation, the symptoms of which may be next considered.

2. *Simple chronic Nephritis*, like most chronic inflammations of internal viscera, in general begins obscurely. At the commencement, indeed, it scarcely presents any appreciable signs. Even throughout its whole course it may

escape the practitioner's notice, unless it be combined, as commonly happens sooner or later, with inflammation of the pelvis of the kidney, or unless the attention be turned to the state of the urine.

Pain in the region of the kidney is seldom complained of, but nevertheless is generally admitted by the patient to be present if he is questioned respecting it. The pain is confined to one or both lumbar regions, and does not shoot downwards to the thigh or testicle, as in acute nephritis. It is aggravated, or, if otherwise wanting, it may be excited, by firm pressure over the kidneys. Often the only proof of increased sensibility of the kidney is, that pressure causes more uneasiness at one side of the spine than at the other. The urine is diminished in quantity, yet is passed more frequently than natural. In the early stage it is feebly acid or neutral; and when the disease is fully formed, it becomes alkaline, and at the same time more or less turbid. The turbidity is owing to the separation of amorphous sediments, which consist at times of phosphate of lime only, more rarely of nothing else but the ammoniaco-magnesian phosphate, but most generally of a mixture of both salts, or of these together with some lithate of ammonia. There is seldom any well-marked fever, but great and progressive exhaustion and emaciation.

The most important of the symptoms of chronic nephritis is the alkaline and turbid state of the urine. This is considered by *M. Rayer* so characteristic in certain circumstances that in all cases of wasting from obscure and apparently constitutional causes, he recommends that the kidneys should be made the object of careful attention wherever the urine is alkaline. Alkaline urine may be connected with diseased spine, diseased bladder or prostate, and even, perhaps, with constitutional cachexies. But from his experience, he is inclined to believe that chronic nephritis, either singly, or concurring with these diseases, is one of its most frequent sources. Where a doubt arises, whether chronic inflammation of the kidney be present or not, some light is occasionally thrown upon the question by observing the effect of local depletion or counter-stimulants in diminishing the alkalinity of the urine, or even removing it for a time altogether. The urine in chronic nephritis very seldom contains any blood or albumen, unless other renal diseases concur. It often presents mucus in considerable quantity, but never purulent matter, unless where inflammation of the pelvis, of the kidney, or of the mucous coat of the bladder be present as a complication.

The terminations of chronic nephritis are not yet thoroughly understood. Sometimes it passes into the acute form of the disease; sometimes it is followed by inflammation of the pelvis of the kidney and suppuration, as indicated by the appearance first of mucus, and then of purulent matter in the urine; probably it ends sometimes in resolution, or in partial induration, which does not interfere with the right discharge of the renal functions afterwards; and in other cases it terminates in extensive induration, cartilaginous degeneration, or atrophy, and may then, in *M. Rayer's* opinion, give rise to coma, chronic vomiting, simple exhaustion, diarrhœa, and other fatal affections, which have been hitherto considered to be connected only with granular deposition. It is not improbable that some of the causes, where these affections have been described by British authors as terminating granular disease with contraction and atrophy of the kidney, have been really the terminations of what *M. Rayer* has considered to be nothing else than simple chronic inflammation.

The *complications* of acute and chronic nephritis constitute a very essential part of their history. On the one hand, neither affection often exists long without leading to other important diseases, both of the urinary organs and elsewhere; and on the other hand, diseases of various organs in the body are more or less apt to induce renal inflammation. In consequence of the complications thus arising, nephritis frequently remains concealed from observation, and is accordingly thought a more rare disease than it is in reality.

The following sketch of these complications is taken chiefly from the elaborate treatise of *M. Rayer*. It will anticipate in part what might be stated under the

subsequent head of the causes of nephritis. The most common complications are diseases of the genito-urinary organs. As already mentioned, chronic inflammation of the substance of the kidney frequently becomes complicated in its course with acute inflammation. Each of these is very apt to follow and complicate acute or chronic inflammation of the pelvis of the kidney, in which case the urine is first mucous or purulent, and then becomes pale and scanty, or altogether suppressed, while the muco-purulent impregnation continues. They may also become complicated with inflammation of the investing renal membrane in the course of formation of renal fistulæ; but the symptoms of this incident are obscure. Nephritis may further follow and complicate almost any chronic organic disease of the kidney, such as dilatation from retention of urine or hydronephrosis of some pathologists, tubercles, serous cysts, and cancer, the last of which in particular is often terminated by the symptoms of acute inflammation. A more rare conjunction is inflammation of the ureter, arising commonly from obstruction of the flow of urine by an impacted calculus, or a tumour, or spontaneous contraction of its canal. The affection of the ureter is here always the prior in point of time; so that the symptoms of nephritis are preceded by pain along the course of the ureter, instead of the pain affecting the lumbar region in the first instance. One of the most frequent of all complications is inflammation of the bladder, in consequence of stone, or of the operation of lithotomy or lithotrity. M. *Rayer* insists strongly on the frequency of this conjunction in such circumstances, and on the tendency of surgeons to overlook the existence of nephritis both in preparing their patients before operating for stone, and in treating the sequelæ of the operation. Their attention is naturally turned to the more prominent symptoms of irritation and inflammation of the bladder; so that they lose sight of a concurring disease, the arrestment of which is not less essential for the patient's safety. He adds that the presence of nephritis may be known by the urine becoming alkaline, which he maintains never to take place so long as the inflammatory action is confined to the bladder. This would be a highly valuable means of diagnosis, did the general fact stand exactly as he alleges. But further observation is required to establish a statement so much opposed to the present opinions of the surgical part of the profession; for inflammation of the bladder is generally considered to render of itself the urine alkaline, where it follows calculus. Another disease of the bladder, occasionally complicated with nephritis, is cancer. Cancer of the bladder, if it do not prove fatal by constitutional exhaustion, through frequent hæmorrhage or constant irritation, generally terminates by inducing inflammation of the kidney; and this appears for the most part to be excited by the malignant tumour obstructing the aperture of the ureter, and so causing retention of urine. Nephritis may likewise be conjoined with diseased prostate, in consequence of the latter occasioning retention of urine, one of the most common immediate causes of the developement of inflammatory action in the kidney. It may likewise concur with gonorrhœa, to which indeed it is related in various ways. Its conjunction with acute gonorrhœa, which, however, is very rare, is presented, when the discharge of an unusually violent gonorrhœa is arrested by the injudicious use of powerful internal stimulants or strong astringent injections. It is more frequently produced in the chronic stage of gonorrhœa, and is then commonly observed to arise from exposure to cold and wet as its direct cause. The symptoms of its production are, first a sense of great irritation in the bladder, then pain in the region of the kidneys, frequent discharge of pale urine, speedily becoming mucous and scanty, and attended with straining and distressing spasms, sometimes involuntary discharge of seminal fluid, and commonly a sense of heat and weight in the perineum. Gonorrhœa may farther produce nephritis, through the medium of stricture of the urethra. But besides, any cause may produce it which occasions obstruction of that canal, such as a calculus impacted in it, or an external tumour or foreign body pressing upon it; and in almost all cases of the kind the inflammation of the kidney is preceded

by inflammation of the bladder.   Diseases of the uterus are apt, sooner or later, to become complicated with nephritis.   It is observed often enough in cancer, or in cartilaginous tumours of the uterus, even sometimes in prolapsus, nay, occasionally in pregnancy, especially where many children have been previously borne.   It is right that obstetrical practitioners should be aware of this fact, and that the lumbar pains so frequently observed from compression of the abdominal viscera by the uterus, or dragging of the parts adjacent, may really at times depend on so different and so serious a cause.   When nephritis complicates pregnancy, it may occasion miscarriage, or difficult and painful labour, or death in childbed, by favouring various important sequelæ.   Inflammation of the kidney sometimes is attended with inflammation of the testicles, and at other times with atrophy of these organs.

Nephritis may also be complicated with diseases in other organs besides those belonging to the genito-urinary apparatus.   The inflammation occasionally spreads to the liver and duodenum from the right kidney, or to the spleen and colon and from that of the left side; and in such circumstances renal fistulæ are sometimes formed, particularly fistulæ opening into the intestinal canal. On the other hand hepatitis has sometimes seemed to lead to nephritis, instead of the latter preceding the former; and the same complication and order of occurrences has been remarked in respect of carcinoma of the liver.   Chronic peritonitis is another disease of the adjacent parts, which sometimes leads to inflammation of the kidney; the symptoms of which however are always obscure, so that it is seldom discovered till on dissection after death.   Some other visceral inflammations at a greater distance occasionally present a similar connexion.   For example, pleurisy and pneumonia sometimes occur during nephritis, and inversely nephritis may be developed during the prevalence of one or another of the pulmonary inflammations.   The latter case is marked by the urine, from acid, becoming alkaline; the former by the converse.   Peritonitis, pleurisy, and pneumonia are much more frequent as incidental diseases in what *M. Rayer* calls albuminous nephritis, that is, granular disease of the kidneys, than in any of the forms of simple nephritis.   Affections of the spinal cord are not unfrequently followed by renal inflammation.   It has been long observed, that injuries of the spinal cord, producing paralysis and retention, are commonly attended with an alkaline and turbid state of the urine.   This has been usually ascribed either to the urine undergoing decay during prolonged exposure to heat in the bladder, or to some modification of the renal function produced directly by the morbid condition of the spinal cord.   *M. Rayer* has satisfied himself that the former explanation is inadequate to account for the phenomenon, because the urine does not decay when retained in the bladder in other circumstances ; and he is inclined to think, that an alkaline state of the urine depends on renal irritation, tending to inflammatory action, and that, when it occurs after injuries of the spine, it should always direct the attention of the surgeon to the state of the kidneys.   Inflammation of the spinal cord in like manner sometimes leads to nephritis ; and so does paraplegia, by inducing retention ; in which circumstances therefore alkalescence of the urine ought always to put the physician on his guard.   Diseases of the brain may be the indirect cause of nephritis, by inducing paraplegia and retention of urine.   A much more important source of such complication, is the tendency of nephritis to terminate in coma and apoplexy, probably through poisoning of the blood by urea and the other ingredients of the urine which are not excreted as usual. The termination of simple nephritis in coma has already been alluded to as an occasional occurrence ; but it will be seen afterwards under the head of GRANULAR DISEASE OF THE KIDNEY, that, if this affection is to be considered with *M. Rayer* as a species of inflammation, coma, convulsions, and apoplexy are among the most common of the complications of nephritis, and may indeed be correctly said to be the natural course of the disease as one of its modes of termination.   Among the diseases during which nephritis may arise as an inter-

current affection typhoid fever must be enumerated, together with all febrile diseases which are apt to be attended with typhus, such as variola, yellow fever, purulent absorptions, the *pustule maligne* produced by inoculation from the flesh of diseased cattle, and the like.   In all such circumstances latent nephritis would appear to be far from so uncommon as was thought before the late inquiries of *M. Rayer*.   The disease is latent because the functions of external relation are oppressed, and likewise because alkalinity of the urine, one of the best signs in general for leading to its detection, is here fallacious, since this state probably occurs merely from functional causes connected with the typhoid state.   Nephritis, arising in typhoid diseases, is sometimes nothing else than the consequence of neglected retention of urine ; but in other cases the exact relation between the local and general disorder is not apparent.   Certain cutaneous diseases seem in some measure connected with chronic nephritis.   It was formerly observed that gravel and calculus lead to the developement of scaly and papular diseases of the skin ; so that, as nephritis may originate in calculus, the apparent connexion between it and cutaneous disorders is in some measure accounted for.   But besides, there is little doubt that nephritis generally may lead to certain cutaneous eruptions, such as eczema, either general, or confined to the genital organs, and also pemphigus.   Dropsical effusion, especially anasarca, has been considered one of the diseases incidental to nephritis ; but *M. Rayer* distinctly denies that it is ever produced during the simple form of the disease, or in any other variety except the granular disorder of the kidneys, which he denominates albuminous nephritis.

The symptoms of inflammation of the pelvis of the kidney, the *Pyelitis* of *M. Rayer*, will, it is hoped, be much elucidated by the forthcoming volume of the pathologist's researches.   Meanwhile it may be sufficient to mention that there is both a chronic and an acute form of the disease ; that it presents other varieties, which have led *M. Rayer* to distinguish a *simple*, a *calculous*, a *gonorrhœal*, and a *gangrenous* pyelitis ; that its tendency is to end in suppuration and commonly also distension of the pelvis and calyces of the kidney ; and that most of its symptoms resemble considerably those of nephritis, with the single exception of the properties of the urine.   The pain more frequently extends to the testicles and is attended with retraction of them, than where the structure of the kidney itself is alone inflamed.   When in the progress of the disease, suppuration and distension of the pelvis or entire kidney have taken place, the enlargement of the organ may be more frequently ascertained by manual examination ; and when the tumour is very large, fluctuation may even be detected. Hectic fever, too, is for the most part better marked than in suppuration of the substance of the kidney.   The urine is not so greatly reduced in quantity, and never suppressed ; but there are frequent and urgent calls to pass it ; and from an early period it presents an admixture of ropy mucus, which ere long gives place in some measure to pus.   The presence of mucus and pus, together with the negative evidence of the absence of disease in other urinary organs, is the best character of pyelitis for distinguishing it from nephritis.

It may terminate in resolution, suppuration, gangrene, and inflammation of the kidney itself.   The second and the last are the most frequent modes of termination.   Matter may accumulate without necessarily occasioning distension ; but more generally the pelvis first expands, and then dilatation of the calyces follows ; at length the substance of the kidney likewise stretches out, as it were, and at the same time loses its healthy structure by atrophy ; and thus occasionally an enormous pouch is formed which is full of pus.   Sometimes, when the inflammation is propagated outwards, it passes to adjacent organs, to which the purulent sac adheres ; and renal fistula is gradually formed.   The fistula may communicate with the various organs in the neighbourhood, such as the liver, spleen, duodenum, colon, diaphragm and lungs, and the adjoining external integuments, thus producing a variety of superadded symptoms, which it is unnecessary to enumerate.   Pyelitis seldom exists long without being com-

plicated with nephritis. Where the two affections concur, the former is gene-
rally prior in point of time. It is also often complicated with inflammation of
the bladder, and it may occur with any of the other disorders of the urinary
organs, which were formerly mentioned as being apt to complicate inflammation
of the parenchyma of the kidney.

Causes. The causes of the several species and forms of inflammation of the
kidneys and their membranes are various. They may be produced by external
injuries, such as blows on the loins, concussion of the body affecting that
quarter in particular, and penetrating wounds of the kidney. Exposure to cold
and wet has the same influence in exciting inflammation there as in other in-
ternal organs. Drinking freely of cold water, especially when the body is
overheated, has several times been observed to have the same effect. One of
its most unequivocal causes is the specific influence of certain irritating poisons
on the kidneys. Cantharides has long been considered one of the most power-
ful poisons of this kind. According to *Rayer*, it would appear to act fully more
upon the bladder and urethra when it is taken internally ; but nevertheless little
doubt can exist that the kidneys may likewise be affected by it, both when
swallowed in poisonous doses, and in particular constitutions when applied out-
wardly in the form of blister. Oil of turpentine has also been known to excite
symptoms like those of nephritis, but more rarely ; and a still more rare agent
of the same nature is nitre. Corrosive sublimate and other corrosive salts of
mercury, when administered in poisonous doses, act in the same manner with
considerable certainty, producing bloody urine, strangury, or at times suppres-
sion, and leaving in the dead body signs of increased action in the kidneys.
Digitalis seems another poison possessing similar properties, with whose effects
however we are less acquainted. The abuse of alcoholic fluids, especially strong
spirits, has been held to be another cause ; but it rather acts by exciting a pre-
disposition than as a direct agent ; and in this country at least, it more fre-
quently occasions granular disease than true inflammatory action. By much
the most frequent cause is the pre-existence of other diseases of the urinary
organs. This subject has been already anticipated, in what was stated above
as to the complications of simple nephritis ; but a brief recapitulation may be
here advisable. The coexistence of other diseases of the urinary organs may
induce renal inflammation in three ways : They may act in the first place as
direct sources of irritation ; as for example, where the kidneys contain calculi
in their substance or their pelvis, or where they are affected with tubercles,
cysts, cancerous degeneration, and the like, or where they have been injured
by external violence. Since, however, calculi, cysts, tubercles, and cancer may
exist for a long time in many without leading to inflammation, it would appear
that some more direct exciting cause must co-operate ; and probably exposure
to cold, internal stimulants, or, in the case of calculi, sudden successions of the
body, are the chief co-operating agents. In the second place, other diseases of
the urinary organs may act by transmission of the inflammatory action along a
continuous membranous surface, if not by sympathy of the different parts of the
same continuous membrane. This seems the usual way in which violent
gonorrhœa in a few rare cases, and inflammation of the bladder much more
frequently, excite nephritis or pyelitis. Lastly, various diseases of the urinary
organs lead indirectly to renal inflammation, by obstructing the discharge of
urine, and in consequence occasioning distension and irritation of the kidney.
These diseases are a calculus obstructing one of the infundibula ; obstruction of
the ureter by a calculus or tumour, or tubercles, or spontaneous contraction of
its canal ; obstruction of its orifice by morbid growths in the bladder, or para-
lysis and distension of the bladder ; obstruction of the urethra by a calculus, by
stricture, by diseased prostate, by a foreign body introduced from without, or
by foreign bodies or tumours pressing upon it externally. In all these cases
accumulation of urine takes place, distension of the pelvis and calyces of the
kidney ensues, and renal inflammation almost certainly follows, if the patient

do not previously die of some more immediate disorder.   Other diseases besides those of the urinary organs may more or less directly excite nephritis.   These it is unnecessary to enumerate, as they were mentioned already among its complications.   The most important of them are diseases of the spine, which appear to act both indirectly by inducing paralysis of the bladder with its consequences, and directly in some obscure way on the renal functions.   The relations of age to inflammation of the kidney are important.   It occurs occasionally in infants, very rarely between infancy and puberty, seldom also between puberty and middle age, and most frequently after that period.   All these facts are easily referrible to the comparative frequency at different ages of the other urinary affections, which either directly excite the nephritis and pyelitis, or predispose to them.   Peculiarities of constitution predispose to nephritis in a remarkable manner.   It is peculiarly frequent, comparatively speaking, in gouty habits, and in those subject to gravel and calculus.

Anatomical characters.   A very complete view of the pathological appearances in inflammation of the kidney has been given in the delineations and treatise of *M. Rayer ;* whose description may be adopted in the following abstract.

In simple acute nephritis, and in the early stage, there are found gorging, and redness or brownness, sometimes partial, often general, affecting chiefly the cortical structure both externally, and where it dips between the tubuli,—enlargement of the blood-vessels of the cortical texture, red points from injection, and sometimes true ecchymosed patches ; occasionally some induration of both textures, especially the tubular part, in which case the general redness is mottled with pale, bloodless patches, and the external surface of the organ is rugous or botryoidal.   There is generally more or less swelling of the kidney, and at times to so great an amount that it weighs four times the healthy standard, or about seventeen ounces.   Where the tubular structure is much affected, the infundibula are sometimes much enlarged, so that the papillæ equal in size that of the nipple.   Purulent deposits are frequently seen, oftener in the cortical than in the tubular structure, sometimes very minute, like grains of sand, and situated near the surface, sometimes in very appreciable masses, as big even as peas, very rarely in larger abscesses.   What have been described by authors as large abscesses of the kidney have been cases of pyelitis leading to suppuration and distension, either of the pelvis or of one or more calyces.   The purulent deposits are surrounded always by a dark-red circle.   Sometimes instead of purulent deposits there is general softening of the cortical texture with purulent infiltration, where the pus is discoverable only by scraping the cut surface with the scalpel.   Ulceration of the papillæ is occasionally met with.   A rare appearance is gangrenous softening, indicated by lividity of the kidney, fever, and such a degree of disintegration that the texture is here and there broken up into tomentous masses by merely washing it.   Imbedded calculi are not uncommon.

In simple chronic nephritis the kidney is commonly found diminished, seldom enlarged, usually somewhat hardened, occasionally almost cartilaginous, on its surface granular, rugous, or botryoidal, generally pale and anæmious, both externally and internally, but sometimes with red mottling, probably from superinduced acute inflammation.   The cortical portion is for the most part chiefly affected.   Sometimes this part of the renal structure is atrophied, so that the tubuli approach one another, as well as the external surface of the kidney ; and, in consequence, the surface of the organ is botryoidal or lobulated, the investing membrane firmly adherent, and sometimes the papillæ much elongated.   Both chronic and acute nephritis are occasionally found to affect both kidneys.

In acute pyelitis in its early stage, the mucous membrane of the pelvis and calyces is found vascular, with red spots of ecchymosis, occasionally blood extravasated upon its inner surface, and sometimes lymph thrown out in patches so as to obstruct the ureter.   At a more advanced stage there is frequently more or less dilatation of the pelvis and calyces, where retention of the urine was the

exciting cause; and occasionally the membrane is softened, ulcerated, or even perforated, where the cause was the presence of a calculus, or where the inflammation, whatsoever its cause, had passed on to gangrene. The urine contained in the pelvis and calyces commonly contains blood and pus, not always discoverable by the naked eye, but visible enough with the help of the microscope. It also sometimes contains amorphous sediments of lithate of ammonia, crystallized lithic acid, crystalline phosphate of magnesia and ammonia, and likewise albumen.

In chronic pyelitis the membrane is dull white, its vessels large and varicose, but without a minute vascular network; the external veins on the kidney are large; the pelvis and calyces are distended in many cases, and then the membrane is thickened, without visible vessels, and the ureter much contracted, sometimes reduced to a mere fibrous cord. The inner surface of the membrane sometimes presents a reddish-brown tint, or this mottled with slate-coloured patches; at other times transparent vesicles, like sudamina, are seen on its surface; and occasionally there are ulcerations corresponding with the pressure produced by the edges and points of calculi. In some cases the ulceration penetrates the membrane, forming urinary fistulæ, which communicate with the subperitoneal cellular tissue, the peritoneal cavity, the liver, the spleen, the colon, the duodenum, or the lungs through the diaphragm. All the phenomena of pyelitis now mentioned may be presented without dilatation of the pelvis. More commonly the pelvis and calyces are much dilated, especially in cases depending on obstruction of urine; and at times the kidney itself becomes dilated and at the same time atrophied, so that a great multilocular membranous pouch is formed, filled with purulent urine, or nearly pure pus, or a mixture of pus, urine, and blood, and frequently containing one or more calculi, or in rare instances acephalocysts, or several strongyli.

Perinephritis, or inflammation of the investing membrane of the kidney, is seldom observed alone, but occasionally in conjunction with inflammation of the kidney itself. It appears in the form of redness and purulent infiltration of the cellular tissue, connecting the membrane and kidney, sometimes with effusion of blood, sometimes with deposition of coagulable lymph in layers. In a few instances the membrane adheres to the peritoneum in the loins; and then it may be found ulcerated, and producing purulent infiltration of the lumbar cellular tissue; or an abscess is formed there, pointing outwards.

Prognosis. The prognosis in inflammation of the kidney depends mainly on the causes and circumstances which give rise to it. That which arises in the course of other urinary diseases is always unfavourable; and when it commences suddenly during some severe chronic disease, such as enlarged prostate, cancer of the bladder, or after the operation of lithotomy or lithotrity, it is generally fatal. Not less unfavourable, for the most part, are those cases which occur in the course of diseases in other organs, such as the liver, lungs, spinal cord or brain. Those which depend upon calculus in the kidney are more frequently arrested, yet are still formidable; and they are commonly fatal if the calculus is lodged in the ureter or bladder in such a way as to cause stoppage of the flow of urine. Nephritis and pyelitis, produced by exposure to cold, or by injuries of the kidneys, are the least unfavourable of all the varieties. Cases attended with suppression of urine, with coma, or with excessive prostration and other typhoid symptoms, are seldom cured. The occasional recurrence of rigors, followed by increase of fever, is an unfavourable sign, inasmuch as it shows continuance and renewal of inflammatory action. Alkalinity of the urine, for the like reason, is upon the whole unpropitious. The termination of the disease in suppuration is indicated, as in other inflammations, by rigors, succeeded by hectic fever, and is likewise an unfavourable, though by no means a fatal circumstance. The favourable signs are the converse of what have just been enumerated; and the most promising circumstances are where no irreme-

diable organic disease pre-exists, and where the urine is neutral or slightly acid, and not tending towards suppression.

Treatment. The treatment does not differ essentially from that of other inflammations. When the disease is acute, blood must immediately be taken from the arm in proportion to the patient's age, constitution, and freedom from exhaustion by prior disease. Little good is done unless faintness be induced. It may be necessary to repeat the venesection again and again, just as in pneumonia or peritonitis; and the repetition of it may either be delayed till its necessity is pointed out by the renewal of the symptoms, in which case free evacuation will again be required; or, which is better practice, a few ounces of blood may be drawn at intervals of five or six hours, without waiting for aggravation of the symptoms. The disease, however, may sometimes be arrested at once, and with much less loss of blood, by following up the first evacuation with a full opiate. For the efficacy of this practice it is essential that venesection be pushed so far as to induce faintness and subdue pain, and that the opiate be given in a full dose of two or three grains of opium, or thirty or forty minims of the tincture, immediately after the faintness passes off. The writer has seen the disease abruptly arrested in this way. Leeches, or cupping to the loins, may be of service after the severity of the inflammation has been subdued by general bloodletting, or in cases where that remedy cannot be resorted to; and they are of frequent service where the inflammation is chronic, more especially in its early stage. The warm bath, the warm hip-bath, and warm fomentations of the loins, have been generally recommended by authors on this subject; but they sometimes do harm, unless the violence of the inflammation be subdued in the first place by more active means. In chronic inflammation, and after the partial subsidence of acute inflammation, the most effectual treatment consists in the use of counter-stimulants applied to the lumbar region, among which the most approved are setons, caustic issues, and the actual cautery. Blisters are generally avoided, on account of the risk of their exerting their peculiar action upon the kidneys and bladder in special constitutions; but there seems no good reason for shunning them, where previous experience may show that the constitution is not of the kind in which they act injuriously.

Anodynes should generally be employed from an early period. The force of the circulation, however, should first be subdued; but after that, pain must be relieved, either as already mentioned by a full opiate administered immediately, or by less doses given according to circumstances. Some prefer hyoscyamus to opium, perhaps without sufficient reason. Where opium must be given frequently, or where it fails to give relief when administered by the mouth, it is often signally useful in the form of clyster or suppository. Some, not without reason, prefer this mode of using opium in all circumstances. Chronic inflammation may be relieved by opiate plasters, friction, or fomentation; but these modes of using anodynes are inapplicable to the acute form of the disease, at least in its early stage. The combination of calomel and opium, so familiarly employed in other acute inflammations, has not been much resorted to in this species, but may be presumed nevertheless to be admissible. The same remark might be applicable to tartar-emetic in nauseating antiphlogistic doses, were it not that there is generally a great tendency to vomiting in the several forms of renal inflammation.

It is needless to observe that in the acute form the diet and regimen must be strictly antiphlogistic. When the acute stage is passed, small quantities of nutritive but easily digestible food may be allowed. In chronic inflammation *M. Rayer* has satisfied himself that a diet moderately animal is better than one purely vegetable; and in all circumstances, except those of acute inflammation, milk is an important article. Complete repose is indispensable in the acute stage and form; and even in the chronic form, or in recovery from the acute, exercise should be long avoided, and practised with caution and in moderation, because it is apt to renew or increase the morbid action. The urine for instance,

when rendered neutral or acid in chronic nephritis, has become speedily alkaline after indiscreet exercise, showing that irritation was renewed.

Certain special symptoms have to be combated. Great importance has been attached to the restoration or increase of the secretion of urine. This is undoubtedly an object of great consequence; but it is to be attained only by subduing inflammation with its own proper remedies, not by the use of diuretic medicines. It is advisable to administer mucilaginous diluents in the acute stage; but diuretics are of no use, and may increase the irritation. In the chronic stage there is not the same objection to them, provided the stimulant species be avoided. Free dilution is sometimes sufficient; but if not, digitalis among vegetable diuretics, and bitartrate of potass among those of the saline class, are the most appropriate. Strangury and frequent micturition are best subdued in general by the treatment already laid down for more general and fundamental purposes, especially by opiates after bloodletting. Opiate clysters, opiate frictions over the perineum, emollient injections into the urethra, and the warm hip-bath may also be resorted to as occasionally serviceable. Few symptoms occasion so great distress as the incessant sickness and frequent vomiting which attend most cases of acute inflammation, and even many instances of the chronic form of the disease. They may sometimes be subdued by small doses of solid opium, by hydrocyanic acid, creosote, or small quantities of ice-cold water, but in general these remedies are merely palliative, frequently they fail altogether, and the practitioner must trust for the removal of vomiting to the fundamental treatment. In chronic nephritis it is probable that creosote may prove a more efficient remedy than in acute inflammation of the kidney; at least its good effects are often shown in vomiting connected with other organic diseases, and among the rest with granular degeneration.

The treatment must of course be directed, not merely to the inflammation of the kidney, but likewise to the disease, if any, which seems to have excited it. Where calculus is present, or the urine presents gravelly deposits, such treatment must be added as the particular variety of calculus or gravel demands. If lithic acid, or the lithates, abound in the urine, the alkaline carbonates should be given, and turpentine and the balsams are sometimes serviceable; if the earthy phosphates constitute the deposit, either acidulous drinks may be administered, or alkalis may be allowed in the form of soda-water or kali-water. It should be remembered that the urine may contain earthy phosphates, although there be no calculus any where, and even no previous tendency to phosphatic gravel; for in the advanced stage of acute, and throughout the whole course of chronic nephritis, the urine is alkaline and loaded more or less with amorphous phosphatic deposits.

It is desirable to correct this condition of the urine, if possible. It cannot be accomplished, however, by acids. The aerated alkaline bicarbonates are more likely to be serviceable. But the surest remedy is the treatment of the fundamental disease, which occasions alkalinity, that is the antiphlogistic treatment of the renal irritation. It is unnecessary to take notice here of the treatment applicable to the other urinary diseases, which may cause or complicate nephritis. One subject only may be alluded to. Wherever retention of urine has been the immediate exciting cause, or is in any way complicated with inflammation of the kidney, the urine must be withdrawn by the catheter; and it is better to use the instrument at stated periods, than to leave it constantly in the bladder, as at one time was the common practice. Where retention is occasioned by a calculus impacted in the ureter, its discharge must be promoted by the moderate use of diluents, the administration of opium in the form of clyster, and the warm bath. Art, however, can accomplish little in this case.

GRANULAR DISEASE OF THE KIDNEY.

Recent discovery of this form of renal disease.—Definition.—Primary symptoms of the acute
and chronic form.—Characters of the urine.—State of the blood.—Secondary diseases.—
Causes.—Prognosis.—Anatomical characters and pathology.—Treatment of the primary
disease.—Of the secondary affections.

DR. BRIGHT* was the first who clearly pointed out, in 1827, the frequent con-
nexion of anasarca and other dropsical affections, with a peculiar disease of the
kidneys, the leading character of which is the deposition of a yellowish granular
matter in its substance, together with the gradual atrophy of its cortical and
tubular structure. There never, perhaps, was an important pathological dis-
covery, which in so short a period has been confirmed by so great a number of
extensive inquiries. Nevertheless, many unaccountably entertain grave doubts
of the truth even of the fundamental discovery, and still more some of the most
material pathological details. The general result, however, of the researches of
Dr. Bright, and of those which have been since made successively by the
writer, by *Dr. Gregory*, *Dr. Osborne*, *M. Solon*, *M. Rayer*, and many other
contributors on a less extensive scale, is that granular degeneration of the kid-
neys is one of the most common of organic disorders; that it is intimately con-
nected with a great variety of both chronic and acute diseases, which it either
exasperates as a complication, or favours by establishing a predisposition; and
that, although often obscure in its characters, it may almost always be success-
fully recognised if skilfully sought for. It is possible, indeed, that those who
have specially attached themselves to the investigation of the subject, may have
allowed themselves occasionally too extensive a range, and included under the
general head of granular disease other organic renal disorders, which may be
distinguished from it on further inquiry. But this proposition, though admitted,
will not affect, at least in any material degree, the validity of the important
general conclusions here laid down.

This disease may be defined as a morbid deposit in the substance of the kid-
ney, generally in a granular form, occasioning atrophy of the proper renal
structure, and indicated by more or less tendency to diminution of the solids of
the urine, generally also by the presence of albumen, and frequently by the
supervention of dropsical effusions.†

Symptoms. The symptoms of granular disease of the kidney are partly
those which properly belong to the primary disorder, and are more or less essen-
tial to it, and partly those which denote the presence of secondary affections.
To the former class may be assigned the symptoms of local uneasiness, those of
disordered digestion, a morbid state of the urine, a diseased condition of the
blood, and leucophlegmatia. To the latter belong the symptoms of œdematous
effusion into the cellular tissue, serous effusion into the sacs of the pleura, peri-
cardium, and peritoneum, inflammation of the serous membranes, bronchitis,
diarrhœa, rheumatism, and apoplectic or epileptic coma.

The primary symptoms, which will first be considered, vary materially at the
commencement, according as the disease breaks forth suddenly, or developes
itself slowly and insidiously; but after a time they become more uniform.

* Reports of Medical Cases, 1827.

† The following summary is chiefly an abstract of what has been already made public by
the writer. *See* ON GRANULAR DEGENERATION OF THE KIDNEYS, &c. 1839.

When it commences in the acute form, the usual symptoms are rigor, ushering in an attack of inflammatory fever, of more or less severity; scantiness of the urine, which is indeed sometimes almost suppressed, always highly albuminous, occasionally bloody, and often passed frequently and with difficulty; lumbar pain, rarely acute, more generally dull, and occasionally, though seldom shooting to the groins or testicles; pain across the pit of the stomach, felt only on pressure, or increased by it, and attended with nausea, and often with vomiting. These symptoms seldom exist long without anasarca being formed; frequently this affection appears in the course of the first or second day; and it commonly puts on the characters of inflammatory dropsy. The subsequent course of the disease is exceedingly various. Sometimes it is checked by active treatment. Sometimes it proves quickly fatal by the developement of some acute visceral inflammation, such as pleurisy, pericarditis, peritonitis, or pneumonia. Frequently it ends in coma, which occurs chiefly in the cases where the urine is greatly reduced in quantity, and which almost always terminates fatally. Most generally the acute symptoms give place to those of the chronic form of the disease, which then runs its own proper course.

Several of the symptoms now enumerated, as those of its acute form, are sometimes wanting. The only invariable character is scanty, highly coagulable urine, with more or less fever. These symptoms may prevail alone for a few days, till coma and convulsions suddenly occur and prove quickly fatal. Hence the disease is not unfrequently misunderstood at first, where it presents itself in such a shape; and it may even continue to escape notice till the examination of the dead body explains its nature. It is altogether a mistake to suppose with *M. Rayer* and some others, that dropsy is an invariable attendant of this or any other form of granular disease of the kidneys.

The chronic form may commence with acute symptoms, which after a time pass off. More generally it commences obscurely and most insidiously, often indeed without any appreciable symptom at all that attracts the patient's attention for months, except perhaps frequency of micturition and slowly increasing debility. If an examination happen to be made at this time, however, it will be found that there are occasionally obscure pains in the loins, increased by pressure, and either a scanty, or on the contrary a superabundant, discharge of pale, sometimes cherry-red or brown, and often muddy urine, low in density, and coagulating more or less by the action of heat and nitric acid. When matters have remained for some time in this state,—which may be for months, or perhaps even for a year or two,—the disease is at length developed either by the supervention of the acuter symptoms somewhat modified, or more generally by the accession of one of the secondary disorders. The fundamental disease is then commonly thus indicated. The strength is much reduced, the body more or less emaciated, the complexion either of a uniform waxy paleness, or dingy, and the skin dry, and little disposed to perspire. There is often drowsiness, often too sickness or retching in the morning, and enfeebled digestion, with much thirst. The urine presents the characters already mentioned, and the blood is thin, watery, and unusually defective in colouring matter. Secondary affections are common; the most frequent of them being dropsy, acute and chronic visceral inflammations, diarrhœa, rheumatism, both acute and chronic, catarrh, diseased heart, and coma. Life may be prolonged for many years under this chronic form of the disease, provided the secondary affections be avoided or easily subdued. But sooner or later the fatal event is occasioned by slowly developed coma, unless some other secondary disorder intervene, and terminate fatally in its own way.

The only essential characters of the chronic form of granular disease of the kidneys, are a reduction of the density of urine, with diminution of its solids, excessive reduction of the colouring matter of the blood, and leucophlegmatia. The presence of albumen in the urine, contrary to the opinion of some authors, is not invariable, though a very general fact.

Such is a sketch of the symptoms which belong more or less essentially to the two forms of this disease. As the condition of the urine and that of the blood are highly important in relation both to its diagnosis and to its pathology, some details on these two heads are called for.

The urine presents a considerable variety of characters, depending more especially on the stage or form of the disease. In the early stage and acute form its essential characters are a moderate reduction of density, a material diminution of the daily discharge of solids, and a strong impregnation of albumen. In the advanced stages and chronic form its sole essential character is reduction of density ; but very generally too there is albumen present, though in small quantity, and for the most part the daily discharge of solid matter is much reduced. There are also, however, other qualities of the urine which well deserve attention, although far from being invariable.

When the symptoms put on the acute form in the early stage, the quantity of urine is most generally a good deal diminished, often to a few ounces daily, sometimes to a few drops only. Its colour is commonly natural, sometimes blood-red. It is often turbid and continues so even after many hours of rest, in consequence of abounding in minute particles which are insoluble by heat, and are occasionally oleaginous in their nature, but far more generally consist of modified mucus or the scales of the epithelion of the urinary mucous membrane. It sometimes deposits lithic acid on cooling, and more rarely lithate or phosphatic sediment on standing a few hours ; occasionally it decays very soon, and becomes powerfully ammoniacal ; but the reverse is the general rule. The density is for the most part under the healthy standard of urine not abounding in quantity ; but the difference is not material, the common range being from 1018 to 1021. Albumen is usually present in large quantity, as shown by heat or nitric acid, severally or conjunctly, occasioning a bulky coagulum. It is sometimes so abundant that the urine forms a uniform tremulous jelly when heated, or else a uniform thick pulp without the separation of fluid. It is seldom so small in amount as to occupy less than a third of the volume of the fluid after the coagulated urine has been allowed to rest for twenty-four hours ; and if the coagulum be separated, washed, and dried, it will be found to weigh seldom less than ten, sometimes so much as twenty-seven grains in every thousand of urine. The best method of searching for albumen in the urine is to treat it, first with heat alone, and then with nitric acid. Heat singly is in general a sufficient test where the proportion of albumen is so large as it invariably is in the acute form ; but where the proportion is moderate, the acid is necessary, on the one hand to secure the separation of the albumen, which may be kept dissolved even under heat, if ammonia has been evolved by decay,—and, on the other hand, to distinguish albumen from the earthy phosphates, which, if in excess, may be detached in the form of a flaky precipitate by heat, but are redissolved by a drop or two of nitric acid. The examination should be made repeatedly, because occasionally the albumen suddenly disappears for a time. It is necessary to attend to the proportion of the albumen, both with a view to the prognosis and the treatment. For this end it should be coagulated in a tube, and left at rest for twenty-four hours : upon which the following degrees of coagulability may be noted :—gelatinous by heat ; very strongly coagulable, where a distinct precipitate separates, occupying, however, the whole fluid ; strongly coagulable, where it occupies half the volume of the fluid ; moderately coagulable, where it occupies a fourth of the fluid ; slightly coagulable, where it occupies an eighth ; feebly coagulable, where it occupies less than an eighth ; and hazy by heat, where a turbidity is occasioned without visible flakes.*

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* It seems unnecessary to overload the text with any investigation of the fallacies, either the tests for albumen, or of albumen as a test of the presence of granular disease ; but a few observations may be here appended. As to the tests for albumen, heat alone is sufficient where the quantity is so great as it usually is in the acute form : and, in all circumstances, nitric acid renders the test of heat unimpeachable. But nitric acid alone is inadequate ;

Besides being diminished in quantity and density, as well as impregnated with albumen, the urine is always defective in the proportion of solids discharged in a given time. The amount of solids discharged in twenty-four hours seldom exceeds half an ounce, which is scarcely the fourth of the healthy average in a stout adult; and it is often only half that quantity or even less. It was observed above, that the urine is occasionally blood-red. In a few rare cases a large proportion of pure blood is discharged with it, and the urine has even been almost entirely displaced by blood.

When the symptoms put on the chronic form the quantity of urine is often natural, not unfrequently much above the healthy standard, so as to constitute a true *diabetes insipidus*, but sometimes on the contrary, very defective. The last condition occurs chiefly when incidental inflammatory action is excited, or when the case is drawing towards a fatal termination; and in such circumstances the diminution is often so great, that only one or two ounces may be passed for many days consecutively. The colour of the urine is occasionally natural or brighter yellow than usual, but far more generally it is pale, often excessively so, frequently too blood-red, sometimes smoke-brown, both of which tints disappear when the urine is coagulated by heat. For the most part there is a peculiar opaline turbidity, not removable by repose, and arising from modified mucus, or the microscopic scales of the epithelion of the urinary mucous membrane; in rare cases strings of viscid mucus are seen. Urinary depositions are not common, yet both lithic and phosphatic amorphous sediments may be occasionally observed. The density is invariably low, very seldom above 1014, usually between 1007 and 1011, not unfrequently 1006, and in a few cases so low as 1004, or perhaps even lower, notwithstanding that the quantity of urine may be also at the same time defective. Albumen is commonly present, and in such quantity as to occupy, when coagulated and allowed to rest, between a fourth and an eighth of the volume of the liquid. It is sometimes, however, absent altogether for a time, especially where the urine is discharged more freely than natural, or towards the close of very slow cases where the density is excessively reduced, though the quantity be likewise greatly diminished. Its proportion generally increases when incidental inflammatory action is excited; and in that case the urine puts on the characters of the acute form of the disease, except that its density continues very low. It is a complete mistake to hold with some late authors that the albumen increases in proportion as the disease advances. The converse proposition is more generally true; but deviations from that rule may occur, partly caused by incidental attacks of inflammation, partly depending in all probability on peculiar modifications of the fundamental disorder. The daily solids of the urine are reduced in quantity. This reduction may be inconsiderable where a spontaneous or artificial diuresis makes compensation by diminished density; but if diuresis do not exist, the solids may be reduced from 67 to 24, or even 15 parts in 1000, and from two ounces to a third of an ounce or even only one drachm in twenty-four hours. The diminution of solids seems to affect all the principles of the

because, where lithate of ammonia abounds, lithic acid is separated; and heat alone is insufficient if the precipitate be small, because this may arise from separation of the earthy phosphates. All other tests are inferior in certainty and convenience. As to the indications derived from the presence of albumen, it appears unquestionable that certain kinds of food may occasion its appearance in the urine of some people: that it may also be produced there by certain poisons that act on the kidneys; occasionally by true nephritis, always more or less by pyelitis; rarely by tubercles; often by carcinoma; often by scurvy and by purpura; seldom during the crises of acute inflammatory diseases or continued fever. Simply and abstractedly, therefore, it is not a proof of granular disease being present in the kidney; but it is far more frequently produced by granular disease than by all other causes put together; and no other cause yet known ever occasions so large a proportion in the urine as is generally seen in the early stage, and sometimes, too, in the chronic form of the disorder; so that urine, at least *moderately coagulable*, according to the definition given above, probably always indicates granular derangement.

urine indiscriminately; but more accurate inquiries on this head are still wanted.

The state of the blood is scarcely less remarkable than that of the urine; and like the latter, the former differs in the acute and chronic forms of granular disease. In the acute form and early stage of the disorder the blood commonly presents a very strong buffy coat, and frequently a lactescent serum, which yields fatty matter to sulphuric ether. Its serum is much reduced in density, namely, from 1029, the healthy average, to 1024, 1022, 1020, or even 1018. As this reduction is chiefly owing to the loss of albumen, the serum coagulates loosely when heated, and instead of ten, contains often only six *per cent.* of solid matter. The reduction in density is always proportional to the amount of albumen discharged with the urine, and the length of time this discharge has existed. The serum very generally contains urea, and always when the urine has been for some time much reduced in quantity. It is discovered most certainly by evaporating the serum to dryness over the vapour bath, boiling the pulverised residuum in absolute alcohol, dissolving the alcoholic extract in water, filtering the solution, and adding to it in a watch-glass half its volume of nitric acid; upon which scaly crystals of nitrate of urea are gradually formed. The fibrin is commonly increased in proportion as in inflammatory blood. The hæmatosin, or colouring matter, is unaltered, provided the disease be really in the incipient stage; but as the disease advances, it is rapidly and greatly diminished. In the chronic form and more advanced stage, the properties of the blood undergo further alteration. The crassamentum does not present a well-marked buffy coat, nor the serum much lactescence, unless inflammation or general reaction concur. The clot is small, or if large loose; and the serum is unusually abundant. The density and solids of the serum are for the most part little or not at all reduced, sometimes even above the average of health. This depends upon the state of the urine as to albumen. If local inflammation, general reaction, or any other cause, should occasion an abundant discharge of albumen with the urine, the serum is reduced in density and solid contents, exactly as in the acute form of the disease. But in most cases of the chronic or passive form, where little albumen is found in the urine, the serum possesses its natural density, or is even seen so high as 1031, and containing 97 instead of 80 parts of solid matter in one thousand. The serum frequently contains urea, but only when the daily discharge of solids with the urine is much reduced. Hence in the middle stage of the disease it is commonly absent, unless where incidental causes occasion a diminution of the urine; but in the most advanced stage it is commonly present; and towards the close of protracted cases it is seldom altogether wanting. The salts of the serum are in their usual proportion. The fibrin too is commonly natural in its proportion. Very different is the case in respect to the hæmatosin of the blood. When the disease has made some progress, whether in the acute or chronic form, the hæmatosin is invariably reduced, and the reduction increases quickly as the degeneration of the kidney advances. Probably no other disease except hæmorrhage occasions so great an impoverishment of the colouring matter of the blood. The healthy proportion in a stout male, being about 1340 grains in 10,000, it has been found reduced in granular disease of the kidney, according to its stage, to 1110, 955, 720, 564, and even 427. The degree of leucophlegmatia corresponds of course with this reduction. The inferences to be founded on these interesting facts are liable to uncertainty, where the patient has been frequently and largely bled, or where he has suffered severely from some of the exhausting incidental diseases, or where the appetite is small and digestion indifferent. But the tendency of granular disease of the kidney, to induce extreme reduction of the hæmatosin of the blood, is undoubted, having been observed where the appetite and digestion had been always tolerable, the blood never impoverished by venesection, and the patient little troubled with secondary disorders.

Of the symptoms now laid down as proper to the fundamental disease, those

most pathognomonic are the several morbid conditions of the urine. It would be wrong, however, to trust these characters alone, as some have proposed. For determining the stage of the disease, the state of the urine is a valuable criterion; but the most unequivocal and most precise is the proportion of hæmatosin in the blood, checked of course by reference to incidental circumstances, and especially frequent, free, and recent bloodletting.

Secondary diseases. Granular disease of the kidneys may follow its course from first to last, without any other symptoms than those hitherto described as proper to the fundamental disorder. Such cases however are rare. In the state of the constitution induced by it, there is an excessive liability to various secondary or incidental maladies. One of these indeed is so common, namely, anasarca, that several esteemed pathologists have held it to be universal and primary, not secondary and occasional. But, from repeated observation, the writer is fully persuaded that this doctrine is founded on error.

The secondary diseases are of great practical consequence; for they are often the first signal of alarm by which the primary disease is indicated. They are rendered much more obstinate than usual by the concurrence of the renal disorder; they constitute the chief sources of immediate danger in its course, at least for a long time; and if they are warded off, life may be protracted for a number of years in a state of very material comfort. The most important secondary affections are dropsy, diarrhœa, pleurisy, peritonitis, pericarditis, pneumonia, catarrh, dyspepsia, chronic vomiting, coma, chronic rheumatism, and chronic organic diseases of the heart and the liver.

Dropsy is the most frequent of all the secondary diseases; it was the one which first drew the attention of *Dr. Bright* to the disorder of the kidneys; and it is still the affection which most generally excites for the first time a suspicion of the existence of disease in these organs. Yet it is not essential. Instances occur where the disease of the kidney runs a long course without any dropsical effusion. It is, however, the most frequent of all the causes of dropsy. The form it most generally occasions is general dropsy or anasarca, attended with more or less effusion into the great serous sacs, and into the pulmonary cellular tissue. The anasarca affects chiefly the limbs and the face, sometimes the latter only. Effusion into the serous sacs is seldom considerable, unless either the general anasarca is very great, or there is an organic disease of some other organ in the cavity besides the kidneys. Most cases of what are usually called inflammatory dropsies depend on disease in the kidney. Many dropsies consequent upon scarlatina are of the same nature. So also are probably all those where the œdematous parts are elastic, and do not pit upon pressure. So too are most, if not all, cases attended with diuresis, provided the urine be not saccharine; and such cases, strange as the fact may appear, are far from being uncommon. Lastly, it is probable that all dropsies owe their origin to the same cause, which are associated with urine of very low density, and not above the natural standard of quantity, whether it be albuminous or not. In dropsy from granular disease of the kidneys the urine is not necessarily albuminous. For the most part, however, it is more or less so; in the early stage of the primary disease this impregnation is always abundant; and the same is the case at all stages when the dropsy appears with the inflammatory character. This secondary disease is probably owing to an increased tendency to transudation, in consequence of the blood being rendered unusually thin and watery in the early stage by diminution of its albumen, and in the advanced stage by reduction of its colouring matter. It is always a most important object in the treatment, because so long as it prevails every other disorder, and almost every other symptom indeed, is apt to be exasperated.

A variety of affections of the stomach may attend granular disease in the kidney. Among those the most familiar is simple dyspepsia or defective digestion, with its customary train of symptoms. The most serious is chronic vomiting, which consists sometimes only of constant sickness and vomiting, occurring

as soon as the patient awakes in the morning, but at other times of frequent vomiting throughout the day, and the rejection of all articles whatever which are swallowed. This affection is particularly apt to be troublesome towards the close of the disease; and it is sometimes the immediate cause of death, in consequence of deficient nutrition, and exhaustion. It does not appear to be generally connected with reaction, inflammation, or any organic disturbance of the stomach. It is always an obstinate complaint, difficult even to palliate, and apt to be renewed.

Diarrhœa has been a very common secondary disorder, as the disease shows itself in Edinburgh. It appears sometimes obviously connected with errors in diet, but more frequently arises without an obvious cause. It sometimes depends merely on inordinate irritability and increased discharge from the mucous membrane of the bowels, and may thus continue long and until death without any particular morbid appearance being discoverable afterwards; but more generally it is nothing else than a chronic dysentery, depending on intestinal ulceration. There is often little pain. The evacuations consist for the most part of watery fæces. It appears sometimes a benignant affection, which carries off dropsy; but far more generally it is a troublesome exhausting complaint, difficult to subdue, and not unfrequently the immediate cause of death. It has not been observed any where so often as at Edinburgh; yet bowel complaints in other circumstances are certainly not more common there than usual.

Inflammation of the serous membrane has been observed as an incidental disorder in every quarter where granular disease of the kidney has been studied; but it appears to be more frequent in London than any where else. Pleurisy is the common variety, next peritonitis, and next pericarditis, which is seldom met with. These disorders are apt to be induced by incidental exposure to cold, and to occur on occasions when the primary disease commences in the acute form in its subsequent course. They are sometimes latent, commonly severe; but, unlike the other secondary disorders, are easily subdued.

Catarrh is one of the most important of the secondary affections. It is often associated with emphysema; and in one shape or another is seldom long absent in any case, at least in northern latitudes. It is occasionally acute, much more frequently chronic. It is often enough cured, yet it is frequently obstinate, and in many instances it is the immediate occasion of death. Few survive long if it be obstinate, more especially where extensive anasarca concurs and the primary disease has made some progress.

Coma and apoplexy are among the most frequent of secondary diseases, and none else is so unfavourable. Sometimes an apoplectic attack supervenes suddenly, and proves quickly fatal; but this is far from being a frequent occurrence. In general the head affection comes on in the insidious form of increased drowsiness, and perhaps some bluntness of the senses and obtuseness of mind. Gradually the drowsiness passes into constant stupor, and this into complete coma, which is occasionally interrupted by convulsions, but much more frequently not. A week at least commonly elapses between the first approach of drowsiness and the fatal event, where the primary disease is of long standing; but where the renal affection is in the incipient stage, and reaction present, the course of the head affection is much more rapid. It is at times connected with congestion or extravasation of blood within the head, or with serous effusion; but generally with no particular morbid appearance, except unusual paleness of the brain, and want of blood in the cerebral vessels. It is commonly connected with suppression or extreme diminution of urine, yet this connexion is not invariable. Extreme diminution, however, seldom prevails long without coma beginning to form. There is no necessary connexion between the extent of the dropsical effusion and the risk of coma. Arachnitis has been observed as a secondary affection of the head by *Dr. Osborne*, and repeated attacks of epilepsy by *Dr. Bright;* but these disorders are comparatively rare. Coma is always a most formidable affection, and is indeed very

seldom amenable to treatment.   Perhaps it ought not to be considered as merely a secondary affection; for it would rather appear to be the natural termination of the primary disease, where it is not abruptly put an end to by some other undoubted incidental disorder.   It seems to be occasioned by poisoning of the blood with the undischarged principles of the urine.   At all events urea is always found abundantly in the serum of the blood, unless where congestive or sanguineous apoplexy is the particular form of the affection.   According to the experience of all observers of the renal disease as it occurs in Edinburgh, this is at the bottom of almost all the obscure cases which every now and then occur of coma in connexion with suppression of urine.

Chronic rheumatism has appeared so common an accompaniment of the advanced stage of granular disease of the kidney, that in all cases of obstinate rheumatic affections, the condition of the urine should be inquired into.   It generally puts on the form of mere neuralgia; occasionally, however, the joints present swelling and redness.   It is always troublesome to remove.   Where dropsy concurs with the primary disease rheumatism is rare.

Pneumonia is not common, pulmonary inflammation putting on more generally the form of bronchitis.   It nevertheless sometimes attends the acute form of granular disease of the kidney, both in the early and in the more advanced stages.   Like other acute inflammations, occurring incidentally in the same circumstances, it is sometimes severe, but for the most part easily checked by proper treatment.

Lastly, organic diseases of the liver and heart concur very frequently with granular degeneration of the kidneys.   Sometimes the one, sometimes the other disease is obviously prior in origin; at other times it is impossible to say which commenced first; and occasionally the three organs are affected together, and nearly in the same degree.   The most common affection of the heart is hypertrophy, with or without valvular obstruction; and this is for the most part betrayed by characteristic symptoms.   It always adds greatly to the patient's sufferings as well as danger, and is a frequent cause of death by aggravating anasarca or catarrh.   Organic disease of the liver is often much more obscurely marked.   Most of the local signs, usually trusted to, may be produced equally by the renal disease alone; its best local signs, fulness, hardness, and dulness on percussion in the right hypochondrium and epigastrium, may be rendered fallacious by serous effusion into the peritoneal sac; and the most common variety of diseased liver in cases of granular liver, namely, the tubercular condition proper to intemperate habits, is far from being always attended with enlargement.   Where other diagnostics are insufficient to decide the question of its presence, it may commonly be inferred to exist where ascites is a predominating part of the dropsical effusion.

Such are the principal diseases which may occur secondarily to granular degeneration of the kidney.   It remains to be observed, that on the contrary this disease of the kidney may occur secondarily to other disorders; among which those hitherto well ascertained are organic diseases of the liver, hypertrophy, and valvular disease of the heart, and phthisis pulmonalis.   Further it may be added, that in diseases generally the accidental presence of granular kidney is almost always the source of additional danger, by aggravating the other disease; which has been well exemplified in the late epidemics of continued fever and malignant cholera of Edinburgh.

Causes.   When granular disease of the kidneys appears in the chronic form its cause is generally very obscure.   Even the acute form sometimes cannot be referred to a specific exciting cause; but generally some unequivocal exposure to cold, or to wet and cold together, precedes it; and many ascribe it to sitting down on a cold stone, or taking a hearty draught of cold water while overheated, or getting wet during night-watching.   In a few instances the disease has apparently followed a blow upon the loins.   Constitutional circumstances clearly predispose to it.   These are the constitution of intemperance, the scro-

fulous habit, and that state of the system which succeeds scarlatina. A very large proportion of the cases observed in Edinburgh have been clearly connected with long-continued habits of intemperance in the use of spirituous liquors. In not a few cases this agent has seemed adequate to produce the disease in its chronic form, without the co-operation of any other more direct cause. In other instances it acts evidently by engendering a predisposition merely; and some other cause developes the renal affection. The strumous constitution is another predisposing circumstance by no means unfrequent; and a very common conjunction of circumstances is habitual intemperance in scrofulous constitutions. Doubts have been raised by some whether scarlatina predisposes to granular disease. But the writer would venture to suggest, that the negative evidence advanced by some can never outweigh the clear and positive evidence brought forward by others, and to observe, that the frequent dependence of granular disease of the kidney upon scarlet fever, at all events as a predisposing, and very probably as a direct exciting cause, is in his opinion firmly established.

It is not improbable that certain agents, which excite irritation of the kidneys, may be arranged among the list of causes. The urine becomes occasionally albuminous under the use of mercury, or in consequence of the action of cantharides upon the urinary organs, or after certain kinds of diet in which cheese, pastry, and heavy puddings predominate. It is not impossible that the frequent or continuous action of such agents may, in the end, induce granular disease of the kidneys in persons predisposed to it; and at all events, there is strong reason for thinking that cases of the kind have been observed after the constitutional action of mercury.

Age, sex, and profession, have only an indirect influence. No age is exempt. Childhood presents a few cases; the period between puberty and adult age a greater proportion; manhood, especially towards the close of it, by far the greatest number; and extreme old age an occasional example. Cases have been met with at the age of five, and younger; and one instance has been recorded by the writer where the patient was an old man of seventy-nine. Of 74 fatal cases *Dr. Bright* found 19 under thirty years of age, 50 under the fiftieth year, 13 above fifty, and 4 above sixty. After infancy the effect of age is referrible to the relative predominance of intemperate habits, and the liability to exposure to atmospheric inclemencies. Profession acts in the like manner. A large proportion of cases in the lower ranks occur among those trades which subject workmen to vicissitudes of heat and cold, or to contract intemperate habits. An erroneous idea has been prevalent that the middle ranks may claim exemption. On the contrary, further experience more and more convinces the writer that the disease is by no means confined to the lower rank, though, without a doubt, proportionally more frequent there; that cases are often met with among persons of easy circumstances by those practitioners, at all events in Edinburgh, who have made themselves conversant with the subject; and that, by others, the disease is not unfrequently lost sight of where it affords the only explanation of apparent anomalies.

Prognosis. An opinion has gained currency, that granular disease of the kidney is an incurable affection; but fortunately its validity admits of question. When the disease is in its early stage, as determined by the urine being not much under the natural standard of density, and by the blood containing nearly its due proportion of colouring matter, there seems no reason to doubt that thorough recovery may be accomplished. If most cases of inflammatory dropsy with coagulable urine after scarlatina are connected with the early stage of granular kidney, which seems probable, radical cures are not uncommon. In other circumstances the practitioner is much more frequently disappointed, because he is apt to mistake for the first commencement of the disease an acute attack, occurring incidentally in the middle of its chronic and latent form. Even in cases unconnected with scarlatina, however, it seems

probable that complete recovery may be brought about when they are subjected to early and judicious treatment.   It is certain at any rate, that in such instances all secondary affections have been removed, all local uneasiness subdued, sometimes even the urine restored to its natural state, and the patient ascertained to enjoy good health for two years and more afterwards.

More generally, though we may succeed in apparently restoring health, the urine continues essentially morbid and more or less albuminous; and in that situation it is not unlikely that the organic derangement may make insidious progress, while it is certain that trifling causes may renew the previous symptoms essential as well as incidental.

When the disease is somewhat advanced, it cannot be removed; because, besides consisting of a morbid deposition in the kidney, it occasions atrophy of the proper renal structure, the loss of which cannot be repaired.   But although the disease, or rather its effects, cannot be removed in this stage, it is probable that they may be arrested so as to proceed no further, and to admit of life being long preserved in a state of comfort and tolerable health.   Such at least seems the rational explanation of the cases, now ascertained to be not uncommon, where the urine continues permanently pale, low in density, and feebly albuminous, although all symptoms of suffering have been removed, all secondary affections arrested, and the general health maintained substantially good for three, four, five years and upwards.

The probability of recovery depends, in the first place then, on the stage of the disease; but it also depends greatly on the nature, number, and severity of the secondary diseases.   Most of the secondary disorders are obstinate when they concur with diseased kidneys.   Dyspepsia may be much mitigated, but is apt to recur. Chronic vomiting, once fairly established, is seldom effectually checked, and may be considered an unfavourable sign.   Diarrhœa is difficult to stop, and apt to return, and therefore must also be viewed as unfavourable.   Catarrh is often removable; but where it resists treatment, the complication is of evil import.   Coma is very rarely arrested, and is one of the most unpropitious prognostics among secondary affections.   Diseased liver and diseased heart are also unpropitious, being themselves incurable, besides aggravating the effects of the renal disorder.   The acute inflammations are generally severe, but commonly yield to remedies.   If they recur often, however, they will generally prove at last the cause of death.   Dropsy, unless excessive, is by no means always an unfavourable sign.   The effusion is sometimes difficult to remove; but for the most part it yields at last; and its removal is usually attended with marked improvement in all the other symptoms.

The danger is not proportional to the amount of albumen in the urine.   On the contrary, where it abounds, the disease is commonly in its incipient stage; and where it is scanty, the disease may be far advanced.   Its gradual disappearance is favourable, especially if combined with a gradual increase of density in the urine.   The danger is not proportional to the inflammatory state of the blood; yet this state requires watching and sometimes treatment.   The danger is greatest where the colouring matter is most reduced in proportion to the other ingredients of the blood.   The danger is not always urgent when the dropsical accumulation is great.   Incidental risks, indeed, arise of speedy death from dyspnœa, or from distension occasioning erythema and gangrene; and besides, so long as the dropsy is considerable, the other symptoms are all more troublesome.   But the dropsy is commonly to be removed with perseverance. The greatest amount of dropsy usually occurs in the early stage of the primary disease.   The danger is on the whole proportional to the lowness of the density of the urine, especially where the quantity is also defective.   But a better way of expressing this rule is to say, that the danger corresponds with the diminution in the daily discharge of solids in the urine.   A patient may live long and in comfortable health, where the diminution has reduced this discharge to one-

third of the natural average; when it descends to a fourth, troublesome secondary symptoms are apt to show themselves; and any materially greater reduction is soon followed by urgent symptoms, and most generally by drowsiness, leading on to coma. Suppression of urine is invariably a fatal prognostic. Gradual increase of the density of the urine, its quantity remaining the same, or increasing, is a very favourable circumstance. In the advanced stages, a spontaneous diuresis seems a favourable incident; and so long as it continues, the patient enjoys tolerable health. The reason is apparently that the quantity makes up for the lowness of density, so that a full amount of solids is discharged daily. The writer has known the health maintained tolerably entire for four years in such circumstances, the patient passing towards eighty ounces daily of pale urine, about 1010 in density.

Anatomical characters and pathology. A considerable variety of alterations of structure are found in the body after death from this disease. Several peculiar derangements of structure are seen in the kidneys; and other organs too are extensively affected, in correspondence with the symptoms during life.

It is probable that the term Granular Disease, so far as concerns the precise appearances found in the kidneys, has been applied too generically. Several forms of disease have been comprehended under it, to whose anatomical characters the name does not well apply, although the phenomena during life, as hitherto known, are much the same in all. At least seven distinct appearances have been described as occurring in connexion with albuminous urine and the various symptoms described above; namely, 1, congestion of the kidney with enlargement, and with or without deposition in its internal structure; 2, a granular deposition into its cortical and tubular textures, sometimes finely granular, sometimes roe-like, and attended with atrophy, or absorption of the proper renal tissue; 3, deposition of a homogeneous yellowish-gray matter, with similar atrophy; 4, disseminated tubercles; 5, induration of semicartilaginous hardness; 6, atrophy, from disappearance of the proper renal structure, with little or no deposition; and, 7, mere anæmia, or paleness, an appearance, however, which is of very doubtful existence as connected simply with albuminous urine and the collateral symptoms. The relation which these several appearances bear to one another is not yet thoroughly understood. In all probability some of them are related together as different stages of one disease. *M. Rayer* is of opinion that the fourth, fifth, and sixth appearances bear no precise relation to true granular disorganization, and that the last two of these are the result of simple chronic nephritis. It is probable, however, that this is a too limited and erroneous view of the subject. All the forms mentioned above agree in occasioning atrophy or absorption of the proper renal structure; and there can be little doubt that this result is the cause of many of the symptoms observed during life, and the immediate source of danger and death. It may be well therefore to arrange the succeeding observations on the morbid appearances, according to the degree of this particular effect.

In the early stage the organic changes in the kidney may escape notice unless carefully looked for. When the disease has put on during life the acute form, the kidneys are found flabby, friable, larger than natural, and commonly twice, sometimes four times the natural weight of four ounces; externally dark with ecchymosed spots, internally also dark and full of blood and speckled often with darker ecchymosed spots, especially in their cortical structure. The cortical texture, which is sometimes alone diseased, and always most affected, is broader than natural, sometimes twice or thrice its usual breadth, and often presents a deposition of granular matter, similar in colour to the surrounding healthy texture, and therefore seen with difficulty unless the kidney be injected with fine injection, in which case the matter does not flow into the morbid deposition, but every where surrounds and defines it. Unless this precaution be taken, the appearances resemble closely those observed in the early stage of

simple nephritis, for which they have accordingly been sometimes mistaken.*
Where the case has lasted some weeks the amount of the granular effusion may
be so great as materially to obscure the proper coarsely striated appearance of
the cortical portion of the kidney.

The bladder is in such cases contracted, and contains only a few drops of
pale urine, highly albuminous, and of rather low density. Other organs pre-
sent various morbid appearances, which will be mentioned presently under an-
other head. They are chiefly the traces of inflammation and hydropic effusion
in the serous sacs. In the head, if death take place by coma, which is the
usual course, there is occasionally found congestion of vessels, extravasation of
blood, or serous effusion; but much more generally no unusual appearance is
seen to explain the manner of death; the state of the brain is that of the simple
apoplexy of *Dr. Abercrombie*. The blood commonly contains urea, and always
if the urine was much diminished for some days before death, which is com-
monly the case.

We are not well acquainted with the appearances presented in the body in the
early stage, when the disease assumes the chronic form at that period; obvi-
ously because, on the occasions when death takes place in such circumstances
from an independent disorder, the attention of the practitioner is rarely called
to the state of the kidneys either before or after death. But in all probability
the appearances are simply a minor degree of the deposition observed in the
more advanced stages.

In the middle stage, when the morbid deposit has made some progress, the
following are the states observed:—The cortical texture is chiefly, or almost
solely affected; but often the disease may be traced also in the internal tubular
structure. The kidney is sometimes of the natural size, occasionally rather
diminished, often considerably enlarged. If large, it is commonly softer than
usual, and rather flabby; if diminished, it is occasionally somewhat hardened.
The investing membrane may in general be easily stripped off. The external
surface is pale, grayish-yellow, or grayish-brown, either uniformly so, or more
commonly mottled, and also speckled with star-like and linear spots of vascu-
larity; and it is also rough, often granular, rarely in this stage, botryoidal or
roselike as at a later period. Internally the cortical texture has almost or
entirely lost its striated appearance and natural reddish-brown hue. It is gray-
ish, yellowish-gray, or reddish-yellow, finely granular, or homogeneous, and
admits very little or none even of the finest injection. The same characters
are seen in that part of the cortical matter which dips between the tubuli. The
tubuli themselves are not much affected; but generally some specks of deposit
may be seen among their striæ, expanding somewhat their bases, and rendering
the fibres finer and more obscure than in the healthy state; and sometimes their
papillæ present red indurations.

The bladder, the urine, and the blood are much in the same state as in the
early stage. Other organs present a variety of morbid alterations, varying
with the secondary affections during life. The supra-renal glands are often
tuberculated and granular. In the head the brain is usually found pale, and
with its membranes less vascular than in ordinary circumstances; but some-
times there is distinct congestion, and more rarely extravasation. Dropsical
effusions are often seen in the cellular tissue, lungs, peritoneum, pleura, and
more rarely in the pericardium. Emphysema is common, together with the
traces of catarrh, namely redness and mucous gorging of the bronchial tubes.
In the lungs, besides œdema, there may be seen redness, sanguinolent infiltra-
tion, and hepatization, being the traces of pneumonia. Turbid serum, with soft
curdy fibrin, is found on the peritoneum or pleura in some cases, indicating
recent inflammation of those membranes. The mucous coat of the intestines

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* *M. Rayer*, in criticising observations made in Britain by the writer and others on the early
stage of the disease, seems to have fallen into this error

often presents redness, effusion of lymph, enlarged muciparous glands, and ulceration. The liver is often tuberculated and enlarged, the spleen softened, the heart hypertrophied, dilated, and enlarged on one or both sides, and sometimes with its valves contracted in the usual way. Among the rarer appearances are œdema of the glottis, ulceration of the larynx, redness of the mucous membrane of the stomach or bladder, induration of the spleen. Traces of old inflammations are not uncommon. All these appearances are of course secondary merely to the fundamental disease in the kidney. They are more frequently seen in this than in the early stage of the primary affection. Although they correspond on the whole with the symptoms during life, they are also often found in the dead body, when they were not betrayed previously by any symptom.

In the advanced stage of the renal disorder the tubuli become involved to a greater extent. The external appearances of the kidney may be the same as before; but frequently too it is lobulated, botryoidal, roselike, or finely granular. The kidneys are sometimes larger than natural; but more frequently now than in the early stage they are found contracted, often greatly so, sometimes to one-eighth of their natural weight. They are generally firmer, especially when contracted, and sometimes they approach to cartilage in hardness. Internally, if the kidney is not diminished, the granular or homogeneous matter occupies a large proportion of the organ; the cortical structure presents scarcely a trace of its proper striated apearance; and the tubili are some of them entirely gone, others broken up into detached fragments, others flattened, or, on the contrary, with their bases expanded, and their fibres fine and delicate; and the matter of a fine injection passes only between the fibres of the tubuli, together with the great vessels passing through the degenerated cortical portion. If, as more generally huppens, the kidney be contracted, its internal appearance is different, the cortical texture is narrow, the tubular bases drawn as it were almost to the surface, the morbid deposit trifling or almost wanting, and the tubuli contracted, twisted and huddled irregularly together. In the most advanced cases the kidney may be seen large and composed of one uniform mass of granular or homogeneous deposit, with only one tubulus remaining of its whole original structure; or it is found shrivelled to the size of a crown, thin, flabby, almost membranous, and without a trace of healthy structure. In such cases the ureter is sometimes impervious. The renal veins occasionally present firm fibrinous clots. The supra-renal glands are indurated.

The blood-vessels and heart are unusually, sometimes excessively, destitute of blood; the membranous organs blanched; the brain singularly white and free of vascularity; the blood commonly loaded with urea; and a great complication of secondary morbid appearances is usually seen, like those described above as occurring also in the middle stage. Instances do occur, however, of the primary disease in the most advanced stage, without any secondary morbid derangement of consequence.

It was observed at the outset of this enumeration of the morbid appearances, that the exact relation in which they all stand to one another is not yet thoroughly understood. But on the whole the probability is, that the disease consists substantially of a peculiar morbid deposit, preceded in the acute form by congestion or even reaction in the kidney, but in the chronic form without any such precursor; that, as the deposit increases, the healthy texture of the kidney begins to be absorbed; that after a time, although the absorption of the healthy structure goes on, the deposition of the morbid deposit often ceases; and that possibly this deposit is sometimes absorbed in its turn. These views derive support, *first*, from observations showing in the two kidneys of the same individual the appearances of what are here considered two distinct stages of the same fundamental disease; and, *secondly*, from the consideration, that the different states of the kidneys in different cases correspond with symptoms during life, varying indeed in degree, but nevertheless essentially the same in

kind. In the early stage the urine is found strongly albuminous and deficient in the daily discharge of solids, but low in density. In the middle stage, whether the kidneys be found contracted or enlarged, and whether the morbid deposit in them be great or small, provided the natural structure be materially invaded, the urine is moderately albuminous, considerably reduced in density, and still defective in daily solids discharged. In the most advanced stage, where the healthy structure is extensively disorganized, either with much or with little morbid deposit, the urine is extremely pale, very low in density, feebly albuminous, unless incidental reaction arise, and exceedingly defective in the daily discharge of solid matter. Some apparent exceptions may be found to these general statements. But they are probably not real, and arise from cases having been included under the head of granular disease, which belong to other affections of the kidney, such as chronic inflammation, acute inflammation, atrophy, and tubercles.

This would be the proper place for considering what is the nature of the morbid action which gives rise to granular deposit and its accompaniment, albuminous urine. Nothing, however, can be brought forward on that subject at present, which is not purely theoretical, and unfit for full discussion in a work like the present. The chief question which naturally arises is, whether the morbid action in the kidneys is of the nature of inflammation or not. The question has derived importance of late, in consequence of *M. Rayer* having adopted the affirmative side, and, in accordance with that view, denominated the disease Albuminous Nephritis. Facts are still wanting to test the validity of that opinion. Meanwhile it may be briefly stated that the chronic form of granular disease, its most frequent variety, would appear as difficult to bring under the category of inflammation as any other chronic organic disease which could be mentioned; and that in most, if not in all, cases of the acute form, the symptoms of local and general reaction may be correctly viewed as secondary or incidental, and not as essential to the fundamental affection. Granular deposition in the kidney in short, like tubercular deposition in the lungs, may be either wholly unconnected with reaction, or it may follow general or local reaction; and the latter circumstance does not necessarily constitute it an inflammatory disease.

Treatment. The treatment must be directed first to the primary disease, and then to its complications or secondary affections.

In the acute form of the primary disease vigorous antiphlogistics are indispensable, and the treatment generally is very much the same with that of the acute inflammation. Free bloodletting, carried to faintness, or till the pulse is affected, and repeated after a short interval if the symptoms be not subdued, constitutes the main remedy. When the force of reaction has been somewhat mitigated, local bloodletting, in the shape of cupping and leeches to the loins, is more serviceable. Depletion is often equally required by the secondary complaints, as by the primary disorder. In the latter its good effects are shown by the removal of local uneasiness, the diminution of the albuminous state of the urine, the increase of its quantity and density, and the improved feelings of comfort. The same active treatment is required where the acute form is superinduced by incidental causes upon the chronic form of the disease. But evacuations need not be pushed so far; and some reserve must be shown in repeating them, on account of the impoverished condition of the blood. Hence it is advisable, whenever any doubt exists as to the real stage of the degeneration of the kidney, to examine the blood analytically, and ascertain the proportion of its colouring globules. The general antiphlogistic regimen must of course be observed in this form, whether in the early or advanced stage. After a time counter-irritants to the loins, such as blisters, issues, and setons, are preferable to depletion.

These remedies become the most appropriate means so soon as the disease

puts on the passive form, and, along with occasional leeches, may be used from the first in the cases which do not present an acute stage.

The maintenance of the cutaneous discharge is of the first importance, in order to produce derivation from the kidneys. This is to be accomplished by warm clothing as soon as the febrile heat has passed away, by Dover's powder, in the dose of five to eight grains thrice a day, and by the regular use of the vapour-bath, or warm bath, every other evening or oftener. The last remedy is particularly useful for removing restlessness, anxiety, and want of sleep. James's powder may be substituted for Dover's powder, and some prefer the acetate of ammonia. But Dover's powder is the most useful, both as a diaphoretic, and likewise as a calmative for allaying pain and irritability. For the latter purpose, hyoscyamus may be combined with the other diaphoretics.

The bowels must be regulated by laxatives. But in general brisk cathartics should be avoided, because in some people they are apt to bring on the diarrhœa, which was described above as often a troublesome secondary affection. Diuretics are unnecessary unless where dropsy prevails, or coma is threatened, in connexion with great decrease of the urine. By some they are considered as positively contra-indicated in all circumstances, on the ground that they add to irritation in the kidneys. But this is not necessarily a just cause of contraindication; because in therapeutics there is no want of instances, where a stimulus of one kind is employed without injury, in respect of the existence of a stimulus or irritation of another kind in the same organ. Besides, diuretics do not increase the albuminous contents of the urine, the amount of which is probably a test of the degree of local irritation; and there are instances where a continual spontaneous diuresis seems to be associated with the enjoyment of health for a period of years in the chronic state of the renal disease. Mercury is contra-indicated in all circumstances, except to aid the action of cathartics and diuretics. In granular disease it generally affects the constitution with great facility, the constitutional action is apt to be severe; and not improbably the peculiar morbid affection of the kidneys is increased rather than diminished.

When the disease has been brought by the preceding treatment into a state of quiescence or arrestment, a rigorous prophylaxis must be observed. Warm clothing, careful avoidance of cold and damp, abstinence from spirituous liquors or the abuse of wine or malt liquors, the use of nutritive digestible food in moderation, the observance of regular and brisk exercise, comprise the leading particulars of the prophylactic plan; and the warm bath at stated intervals is an excellent addition. By these means there is some hope of arresting the further progress of organic derangement of the kidneys, even where considerable advance has been made; and they are absolutely indispensable for avoiding the immediate sources of danger to life—the incidental developement of secondary diseases.

As the secondary disorders are the chief sources both of danger and of discomfort, their treatment is a most material part of the method of cure upon all occasions. They may on the whole be treated as in ordinary circumstances. It must be always remembered, however, that the greater part of them are apt to be peculiarly obstinate; and a further consideration is, that the primary disease should always be kept in view, even when in the chronic form, and therefore that, as *Dr. Osborne* has pointed out, diaphoretics ought to be used, whatever additional treatment may be necessary.

Anasarca in the acute form requires, like the primary disease, free bloodletting. Without this preliminary no other treatment is available, and it is sometimes sufficient of itself, if vigorously employed at the first. General excitement or local reaction having been removed, the anasarcous accumulations may be treated by purgatives, diuretics, and diaphoretics. Diaphoretics sometimes succeed alone, and where they answer they are preferable, as being derivatives, besides avoiding any possibility of risk from additional stimulation of the kidneys. Purgatives are not to be recommended unless other means fail, on

account of the risk of troublesome or dangerous diarrhœa arising; yet they may often be used with safety where the primary disease is not far advanced, the constitution not much reduced, and the bowels free of irritability. The most useful purgatives are gamboge, finely pulverized with cream of tartar, elaterium, and croton-oil with the compound colocynth mass. Diuretics have been condemned, first by *Dr. Osborne*, and latterly also by *Dr. Bright*, for the reason formerly assigned. The relief obtained from all other symptoms by the removal of extensive dropsical effusions is so great, that the usual means of accomplishing that object must not be lightly discarded. Were it generally possible to remove dropsy by diaphoretics, as is stated by these authors, diuretics might be advantageously avoided. But the diaphoretic plan certainly has not succeeded so often as is desirable in the trials of it which have been made in the Edinburgh Infirmary. Besides, it was observed previously, that doubts may exist whether diuretics are apt to produce the injurious effects as stimulants of the kidneys, which have been imagined. On the whole, the writer would infer from his own frequent experience, that they may be used in dropsy without risk of aggravating the primary disease; and that hydropic effusions cannot in general be so efficiently removed in any other way. The best diuretics are digitalis and bitartrate of potash, and it is useful to employ both at once; the former in the dose of one or two grains of the powder, or ten or fifteen minims of the tincture, thrice a day, and the latter to the amount of a drachm or two drachms as frequently. The decoction of broom-tops also often answers well, and squill sometimes; the spiritus ætheris nitrici more seldom succeeds; nor is nitre, carbonate of potash, or hollands, often serviceable. Where diuretics fail to act, their action is sometimes brought on by an emetic or a single brisk purgative. The effect of diuretics on the dropsical effusion is often very gradual, though steady; and they act for the most part more quickly in the advanced than in the early stage. When other means fail it may be necessary to puncture the limbs. This should be done with accurate puncture needles, not by means of incisions with the lancet, because the former method is less apt to be followed by inflammation and sloughing. This risk is lessened by resorting to punctures before the distension becomes very great. Diaphoretics should be united with the diuretic plan, and steadily persevered with so soon as diuretics cease to be necessary.

Dyspepsia is to be treated with bitters and antacids, and is often removed by removing concomitant anasarca. For chronic vomiting, when dyspepsia puts on that form, there is not any very efficient remedy. Æther, brandy, and ammonia, sometimes palliate it. Antacids also have occasionally the same effect. Blisters over the stomach are not unfrequently serviceable. Opium and hydrocyanic acid are often effectual for a time; and the most efficient perhaps of all palliatives is creosote in the dose of one or two minims.

Diarrhœa at its first appearance may often be arrested, as in ordinary attacks of this disease, by alternate doses of opium and mild laxatives, followed by small opiates regularly for some days. Where it puts on a more obstinate form, the best remedy is a combination of opium and acetate of lead, in the dose of one grain of the former and three of the latter, given in the form of a pill thrice a day; which dose may be doubled if necessary. An opium suppository of three grains is often the most effectual of all remedies. The diet at the same time should be as much of an animal nature as possible, the drink should be restricted, and malt liquors and acids avoided. To quench thirst, which is often urgent, the best of all drinks is soda-water or potash-water, with or without wine.

The treatment of acute serous inflammations, pneumonia, and catarrh, scarcely requires any particular directions. It does not differ from the ordinary treatment of these diseases in other circumstances, and is commonly successful, except in catarrh, which is often obstinate. The best remedy is the removal of the dropsy, with which the catarrh is commonly accompanied. Squill,

with opium, constitutes a useful expectorant and calmative. *Dr. Osborne* is partial to copaiva where expectoration is difficult, and to acetate of lead where it is profuse.

Chronic rheumatism, an untractable malady in all circumstances, is peculiarly so when coincident with granular kidneys. No method of treatment is even generally successful; but among various familiar plans the most beneficial appears to be the internal use of tincture of colchicum and muriate of morphia, together with the warm bath. Diseased liver is seldom improved by any treatment; but iodine is probably more often of service than any thing else. Diseases of the heart are always much improved, so far as their symptoms are concerned, by removal of the dropsy; and anodyne anti-spasmodics always relieve the spasmodic dyspnœa which attends them.

Coma, the most formidable of all secondary disorders, may be averted occasionally in the early stage of granular kidney, if the practitioner takes alarm in time, by free bloodletting, brisk purgatives and active diuretics. Drowsiness, in connexion with great decrease of urine, may thus be prevented from passing into stupor. But where coma in such circumstances is once fully formed, treatment of every kind for the most part fails. Where the same affection occurs in the advanced stage of the disease, it generally approaches slowly and insidiously, and is with great difficulty averted. Where signs of cerebral congestion are present, which, however, rarely happens, local depletion is sometimes of service; and brisk purgatives are also proper where the patient's strength will permit of their use. But the chief remedies are diuretics; and where these fail to act, the case may be considered as almost desperate. The most effectual diuretic treatment consists in the combination of digitalis and bitartrate of potash. *Dr. Osborne* puts faith in calomel for averting coma.

OTHER CHRONIC ORGANIC DISEASES OF THE KIDNEYS.

Hyperæmia.—Anæmia.—Atrophy.—Tubercles.—Carcinoma.—Melanosis.—Developement of the erectile tissue.—Phlebitis.—Serous cysts.—Hydro-nephrosis.

THE remaining organic diseases of the kidneys will require but a few observations. They are interesting chiefly in relation to pathological anatomy, because the practitioner can detect few of them by characteristic symptoms, and cannot arrest any of them by treatment. The sketch here given of them is derived chiefly from the late investigations of *M. Rayer*.

Hyperæmia, though admitted as a disease, is probably a mere accompaniment of other diseases. In the dead body it is characterized by unusual darkness of the kidneys, gorging of their structure with blood, and increased vascularity. It attends the early stage of acute nephritis, the early stage of granular degeneration in its acute form, and frequently also diabetes. It is also sometimes seen, together with hyperæmia of other viscera, in severe cases of typhus. The symptoms of mere hyperæmia, detached from those of the diseases it accompanies, are unknown.

Anæmia, or excessive paleness and deficiency of blood in the kidneys, is of doubtful existence as a local disease. It occurs in conjunction with a bloodless condition of the body generally; as in death from hæmorrhage after frequent copious depletion, or in consequence of protracted acute or chronic visceral diseases. But it is probable that cases of apparent anæmia of the kidneys have been rather cases of granular degeneration.

Atrophy of one or both kidneys can scarcely be regarded as a special disease, but is rather the consequence of various diseases. Almost all chronic organic

diseases of the kidneys may be said to end in atrophy. Sometimes the atrophy of their proper structure is unattended with diminution of their size, or they may even actually increase in size, because a morbid deposit is at the same time thrown out. In other instances, the wasting of the proper renal structure is attended with gradual shrinking of the kidneys, till at length occasionally little else remains but a membranous substance. The symptoms essential to atrophy are, diminution of the colour, density, and daily discharge of solids of the urine; but a variety of other symptoms are superadded, according to the nature of the fundamental disease by which the atrophy is occasioned. The most frequent cause of atrophy with diminution of size is granular deposition, and next to this may be placed chronic nephritis. The appearances usually seen have been described under the former head.

Tubercles may affect either the membranes of the kidneys or their substance. They vary in size from that of small grains to that of an olive; and they are commonly granular and grouped among the tubuli, but large and detached in the cortical texture. Tubercular kidneys are seldom contracted in size, and seldom much enlarged, unless the tubercles obstruct the papillæ or ureters, and cause distension. The proper renal structure is sometimes injected, more generally atrophied. Tubercles seldom invade the capsule of the kidney; but the mucous membrane of the calyces, pelvis, and ureter is not unfrequently affected, and sometimes the bladder too is involved in the disease; while the substance of the kidneys seems about as liable to it as the inner membrane. Sometimes the whole mass of one kidney, and great part of the other, are converted into a uniform tubercular substance. Tubercles of the kidneys sometimes undergo softening; and occasionally they ulcerate and establish a communication with the colon, or with the subperitoneal cellular tissue. They are most frequent in adults, rare in infancy or old age; and they are seldom found in the kidneys without being seen also in other parts of the genito-urinary apparatus, and likewise in the lungs. The symptoms are very obscure and dubious. Tubercles often concur with glandular degeneration.

Carcinoma not unfrequently affects the kidneys when it also exists elsewhere; but it seldom affects the kidneys alone. Sometimes it commences in adjoining organs, and is communicated to the kidney through juxta-position. At other times, on the contrary, it obviously commences in the kidney, and successively affects the parts in its vicinity, more especially the vena cava, which becomes gradually filled with carcinomatous deposition, and at length completely obstructed. The cerebriform or cephalomatous form of carcinoma is the most frequent variety. As the disease advances softening takes place, and the morbid deposit at last acquires a pulpy consistence like pudding. Its progress is sometimes attended with purulent deposits. The kidneys are sometimes not enlarged; but more generally they exceed considerably the natural size. As the cephalomatous matter increases, the proper renal structure diminishes, and at length entirely disappears. Fungus hæmatodes is a rarer form of carcinoma of the kidney. The morbid formation then consists partly of cerebriform matter, partly of clots of blood; and not unfrequently schirrous masses are scattered throughout the general fungoid mass. As in the case of cephaloma, so here the renal veins and vena cava are often obstructed; but the obstruction is commonly occasioned by clots of blood. The substance of the kidneys is more frequently affected than the membrane of the pelvis. The symptoms are obscure, unless where the variety present is fungus hæmatodes; in which case there is frequent hæmorrhage from the bladder, conjoined with the constitutional characters of malignant disease. In one case under the writer's care where both kidneys were extensively affected with cephaloma, the urine was pale, low in density, and albuminous; the patient was subject to dropsy, and the immediate cause of death was coma; so that in all its circumstances, this case resembled during life granular degeneration. In another instance, where the cerebriform

deposit had invaded the vena cava from the kidney, and caused total oblitera-
tion, the superficial veins on the abdomen, from the groins up to the mammary
region, were greatly enlarged, to carry on the circulation of the limbs.

Melanosis has been met with in the kidney, seldom to a great extent, and
never except when it also existed elsewhere. The *erectile tissue* has also occa-
sionally been developed in small portions of the kidney. The renal veins have
been found affected with *phlebitis* in persons who had died of uterine phlebitis,
but very rarely without inflammation of the veins elsewhere. None of these
disorders is indicated by characteristic symptoms. *Serous cysts* are often found
in the kidneys, small in size, and few in number, without any symptoms having
been observed during life. When more numerous, they are formed at the ex-
pense of the proper renal texture, and may lead to the usual consequences of
diminished secretion of urinary solids. They frequently coincide with granu-
lar degeneration.

The last renal disease requiring notice is partial or general distension of the
kidneys by urine, which has been conveniently termed by *M. Rayer*, *Hydro-
nephrosis*. When the tube of one of the papillæ of a calyx is obstructed by a
calculus or other cause, it becomes gradually dilated till a cyst of considerable
size is formed in the kidney, which is filled with urine. In like manner when
the ureter is obstructed by spontaneous contraction, the dropping of a calculus
or hydatid into its cavity, the pressure of a tumour or calculus in the bladder
on its orifice, or the pressure of a tumour of the uterus or vagina from without,
the upper portion of the ureter, the pelvis of the kidney, and eventually the
substance of the kidney itself, become distended by the secreted fluid. The
same changes may occur from habitual retention of urine in the bladder, where
the obstruction to the urine is in the urethra. In all these circumstances in-
flammation of the pelvis, or of the substance of the kidney, may ensue; as was
stated under the head of the causes and complications of nephritis. But if the
distension be gradual, no great irritation is excited, and either the pelvis and
calyces only are dilated, or more generally the renal substance also, the cortical
and tubular parts of which are gradually evolved, atrophied, and absorbed, till
at last nothing is left but a membranous bag. These changes in the structure
of the kidney take place in some rare cases without enlargement; more gene-
rally there is considerable dilatation, and at times the enlargement is enormous,
so that the cavity contains eight pounds. Where the bladder has been long
affected with retention, and its state neglected, there may be found, as in a case
lately examined by the writer, great dilatation of the kidney, enlargement of
the ureter to the size of the small intestine, and also enormous expansion of the
bladder. The fluid contained in the sac is urine, commonly somewhat altered,
and impregnated with albumen. This disease is seldom marked by charac-
teristic symptoms. If it depend on obstruction to the flow of urine from the
bladder, the renal disorder is obscured by the symptoms proper to distension of
the bladder. Where the obstruction lies in the ureter, the disease may be alto-
gether latent; but sometimes constant lumbar pain in one side may lead to a
suspicion of mischief; upon which, if the dilatation be considerable, a tumour
may be detected by manual examination, on placing the patient with his face
on the pillow, and with his knees bent up under him. Most frequently the
disease continues undiscovered till after death. At times, simultaneous or
successive obstruction of both ureters leads to total retention of urine, which
imitates suppression.

The excellent memoirs of Dr. Christison on the affections of the urinary organs, leave little
to be desired. The study of these diseases has been, of late years, carried so much further
than formerly, that a new set of disorders seem to have been brought before the medical world,
not that they were before positively unknown, but were masked or concealed under dif-
ferent names, derived rather from the symptoms than the lesions which are now regarded as •
the leading pathological character. It is not, however, yet demonstrated, whether the mere

organic lesion of the kidneys is the cause of some of the constitutional symptoms or the effect; the probability is, that either mode of stating the proposition may be regarded as correct, and that in many diseases of the kidneys the cause and effect are naturally convertible one into the other.

It is very clear, from a reference to the text, that although the pathognomonic symptoms of disease of the kidneys consist in the alterations of the urinary secretion, with occasional uneasiness in the lumbar region, yet the attention of physicians is not always first directed towards them, nor are they in most cases the immediate cause of death. When the disease extends to the neck of the bladder, the irritation felt in passing water will naturally indicate the urinary organs as the seat of the mischief; but if the bladder be not involved, the signs of local irritation are often too slight to attract much notice. The physician is usually called to the case as one of dropsy, or of ill-defined languor and feebleness, if it be chronic; or to a disease presenting either the symptoms of subacute arachnitis, or of the typhoid state, if it be of the acute form. Practically, therefore, it is necessary to be alive to the possibility of error in the diagnosis of these disorders, and if we cannot satisfy ourselves that they are really primitive affections, the condition of the kidneys must be carefully examined, and the symptoms will often be traced to some one of the lesions of these organs. Most of the secondary symptoms of kidney disease may arise from lesions very different in their anatomical character; but all agreeing so far that they produce an altered condition of the blood, which is in all probability the immediate cause of the cerebral disturbance. In this respect we find a very close connexion between the alterations of the liver and of the kidneys,—both organs producing, in many cases, intense stupor, and other cerebral symptoms: but the lesions of the liver rarely disturb the brain, unless they are accompanied by jaundice, which affords conclusive proof in itself, that a foreign ingredient is found in the blood.

The diseases of the kidneys do not of course produce as decided an alteration of the complexion as those of the liver; but if the patients who labour under them be attentively examined, there will be found a preternatural tint very difficult to describe, but easily recognised by one conversant with the aspect of patients labouring under renal dropsy.   G.

DISEASES OF THE BLADDER AND URETHRA.

Inflammation.—Vesical catarrh.—Irritable bladder.—Diseases of the prostate gland.—Stricture of the urethra.

DISEASES of the bladder and urethra are generally held to belong to the province rather of the surgeon than of the physician. On that account, it is unnecessary to consider them in detail in a work on the Practice of Physic. At the same time, some of them may fall quite as well under the cognisance of the physician as under that of the surgeon; and it is indispensable that the former be acquainted with them, because the symptoms are often such as may otherwise lead him to mistake them for those diseases of the kidney, which fall properly under his care, and which have been fully treated in the preceding pages. Hence it would be wrong to dismiss the subject of urinary diseases as a branch of the practice of physic, without some notice being taken of those which affect the bladder and urethra. But a short sketch of their diagnosis will be sufficient. These are chiefly inflammation of the bladder, catarrh of the bladder, spasm of the bladder, irritable bladder, diseased prostate gland, and stricture of the urethra.

Inflammation of the bladder may be occasioned by blows or other injuries in the neighbourhood of that organ, by acrid diuretics, by surgical operations involving the bladder, by the injudicious use of instruments for examining or treating diseases of the urethra or bladder, and by repelled gout and other more

obscure causes. Its symptoms are acute burning or throbbing pain in the lower part of the pelvis, tension and tenderness in the hypogastrium, constant desire and inability to pass urine, with the usual constitutional signs of general reaction. The urine is at first scanty, dense, high-coloured, and turbid on standing; but in a short time it becomes somewhat turbid even when just passed, probably from modified mucus, and not unfrequently blood is mixed with it. When the disease goes on unchecked, the pain extends upwards throughout the abdomen generally, which becomes tense and tender; nausea and vomiting, with great prostration, anxiety, and restlessness ensue: and involuntary discharge of urine, subsultus of the tendons, delirium, and commonly also convulsions, usher in the fatal termination. Certain varieties in the symptoms have been supposed to depend on the particular seat of the inflammation at the commencement; namely, retention of urine and excessive pain on introducing the catheter into the bladder, upon inflammation of the cervix; suppression and hypogastric tenderness, on inflammation around the vesical orifices of the ureters; tenesmus, on inflammation of the posterior surface.

Dr. Prout has described a form of cystitis, where the inflammation assumes the latent character in gouty individuals, consequent upon an attack of irregular gout. It is preceded by rigors; febrile exacerbations follow; and they gradually increase in severity. At length, irritative fever of the most formidable kind is established, attended with extreme prostration, oppressive nausea and vomiting, but for a considerable time without any urinary complaints. In the end retention of urine occurs more or less, and the external organs become tumid; after which the patient rapidly sinks. The urine does not deviate from the healthy condition.

It is plain that in the commencement of inflammation of the bladder, at which time alone any difficulty can occur in distinguishing it from inflammation and other acute diseases of the kidneys, the diagnosis may be founded on the relative condition of the urine.

Catarrh of the bladder. The cystirrhœa of nosographists is usually distinguished from inflammation, though probably in its nature inflammatory, at least at the commencement. It is sometimes an acute, far more generally a chronic disorder, which attacks elderly persons chiefly, occurs in connexion with the gouty habit or strumous constitution, and seems to arise from exposure to cold, excesses of various kinds, acrid ingesta, stone in the bladder, or other urinary diseases. It sometimes commences suddenly, but for the most part gradually. The principal symptoms are shooting pains, with spasm and burning, in the region of the bladder, and a feeling of weight in the perineum; afterwards also frequent micturition and dysuria, and at length irritative fever, with much debility, weakness in the loins, emaciation, restlessness, and gradual exhaustion. The urine at first is acid, muddy with floating flakes, which only in part subside under repose, leaving an opaline appearance, which probably depends on suspended microscopic scales of the mucous epithelion. Afterwards it presents more distinctly an admixture of stringy mucus, which sinks to the bottom, and collects in a gelatinous mass, incapable of being again diffused by agitation; and in the severer forms of the disease mucus is often passed in gelatinous threads, which occasion great difficulty and distress in discharging urine. At the same time, the urine commonly becomes alkaline, often also somewhat albuminous, occasionally bloody; and not unfrequently it acquires a fetid putrescent odour. Alkalinity of the urine has been thought by *M. Rayer* not to show itself, unless nephritis concurs; but this is a doubtful statement. In the most advanced stages of very chronic cases where ulceration of the inner membrane of the bladder may concur, pus is discharged with the urine as well as mucus, and at times there is considerable hemorrhage. In all circumstances mucus, the characteristic ingredient of the urine in vesical catarrh, may be easily known from pus and other deposits by the jelly-like appearance which it assumes in the

bottom of the vessel when the urine is allowed to stand for some time, and the supernatant fluid is poured off.

Other urinary diseases may in general be distinguished readily from vesical catarrh by the general symptoms and condition of the urine in their early stage. As they advance, however, the diagnosis becomes often very difficult : because in the course of time they are apt to be complicated with irritation of the bladder, and excessive secretion from its mucous membrane, so that it is not easy to determine which is the primary disorder.

Spasm of the bladder, a rare affection, which may occur at any age, but is chiefly observed in old people, is characterized by an acute sense of pain and constriction in the region of the bladder, sometimes stretching forward to the urethra ; globular contraction of the bladder ; retention of urine ; frequent pressing calls to stool, often attended with protrusion of the rectum ; excessive anxiety, restlessness, and clammy perspiration, but without any fever or tenderness on pressure in the hypogastrium. If not put an end to by proper measures, it may terminate fatally with the usual symptoms of suppression of urine.

The term *Irritable bladder* has been used in surgery with various meanings, being sometimes applied generally to the mere symptom of irritability of the bladder causing frequent micturition preceded by pain or other uneasiness, and sometimes restricted to that species of irritability which is connected with nervous causes or functional circumstances, and is independent alike of organic disease in the urinary organs and of any diseased condition of the urine. Irritable bladder, in its more comprehensive sense, may be occasioned by almost any organic disease of the kidneys, the bladder itself, or their adjuncts ; and it is likewise often produced by functional disturbances, leading to a change in the qualities of the urine. The more specific disease, now conveniently indicated by the same term, is not uncommon among individuals of a nervous temperament, especially exhibiting itself in the female sex by a tendency to hysteria. It is often mistaken for more serious diseases of the urinary organs, but may be known by the frequent and urgent calls to pass urine occurring only in the daytime, or being at least much more troublesome then, than during the night, by this symptom being aggravated by all causes of nervous excitement and diminished by tranquillity and repose, by the urine being perfectly natural both in quantity and quality, and by the absence of the other signs of organic urinary diseases. Among the organic diseases with which it is apt to be confounded, none perhaps is a more frequent source of error than granular degeneration of the kidneys ; but the state of the urine supplies a ready mode of distinguishing them.

Diseases of the prostate gland have sometimes been confounded with other diseases of the urinary organs ; but are easily recognised with ordinary care. Chronic enlargement of the gland, a very common disorder in old age, generally commences obscurely, and attains some size before attracting attention. Its symptoms are a sense of weight at the outlet of the pelvis, difficulty and effort in passing urine, sometimes complete obstruction, and enlargement of the part as felt through the rectum. When the gland is examined by the rectum, a catheter should be first introduced into the urethra, otherwise the healthy condition of the part may be mistaken by the unpractised for enlargement. Flattening of the fæces, a symptom mentioned by some authors, is not at all to be trusted to, and is indeed seldom observed, even in unequivocal cases of enlarged prostate. The urine at first is natural in its qualities ; but as the disease advances, it is apt to become alkaline, and to deposit phosphatic gravel. Occasionally inflammation of the gland is superadded, the symptoms of which are, unusual sense of weight and heat at the neck of the bladder ; sometimes pulsating pain, increased on pressure ; tenderness of the gland, when examined by the rectum ; pain on going to stool, with a sense of imperfect evacuation of the gut afterwards ; frequent and urgent desire to pass urine, with difficulty in

passing it, or complete retention.   Inflammation is seldom confined long to the prostate gland ; the bladder sooner or later becomes involved.   Sometimes the inflammation leads to ulceration, which may be known by the progress of the disease, and the presence of purulent matter in the urine.

It may appear unnecessary to mention *Stricture of the urethra* among the disorders which may be confounded with diseases of the kidney.   But as there are cases of purely renal affections, the prominent symptoms of which are referrible to the urethra alone, it often becomes necessary to inquire into the possibility of the existence of stricture.   The diagnosis is to be founded partly on the mode in which the urine is discharged ; but chiefly on an examination of the passage with a sound, catheter, or bougie.

DISEASES

OF

THE UTERUS AND OVARIA.

DISORDERED MENSTRUATION.

General observations on the phenomena of menstruation.—Imperfect puberty—precocious—
tardy.—Faulty developement.—Suspended menstruation, or Amenorrhœa—coexistent with
healthy state of the constitution—with organic disease—with constitutional debility—with
plethora.—Complications.—Treatment.—Vicarious menstruation.—Painful menstruation, or
dysmenorrhœa.—Symptoms.—Inflammatory and neuralgic forms.—Causes.—Prognosis.—
Treatment.—Excessive menstruation, or menorrhagia.—Pathology.—Causes.—Symptoms.
—Prognosis.—Forms.—Treatment.—Chronic menorrhagia and its treatment.

For a period of about thirty-five years, the uterus pours out during a few days
of each month a blood-like fluid, which does not seem to be so much a mere
passive exudation, dependent on local causes, as the result of a general state of
the female constitution; since this peculiar secretion shows itself as the external
sign of a function, the developement of which, we are certain, influences the
whole organism.

Up to the ordinary age of puberty, the uterus had merely exhibited the
lowest phenomena of animal life, those of simple vegetation or growth. At
this period, however, it begins to put on the signs of a higher vitality in the
acquirement of the additional properties of secretion and irritability. While
these are localizing, great changes are observable in the whole frame. The
nervous system is altered in its capacity of emotion and passion, and the imagi-
nation is in an especial manner developed. According to Soemmerring, the
cerebellum becomes much enlarged; the blood is attracted to the upper and the
lower portions of the trunk, subserving to the rapid developement of the mammæ
and the pelvic viscera; the hips enlarge; the ovaria become red and swollen;
the Fallopian tubes, with their fimbriæ, are elongated, erectile, and irritable;
the uterus has acquired bulk, and a more sanguine hue; the organs of the
thorax participate in the effects of that action, which is increasing the mammæ,
so that the lungs, the larynx, and even the arms acquire the forms and contours
of a maturer developement; the intensity of vitality is such, and so complete is
the resistance of the frame, at puberty, in the conflict against external elements,
that the mortality of our species is least in this portion of our life.

On the other hand, the whole body suffers when the internal organs of genera-

tion are undeveloped : the mind is dull, and the emotions and passions depressed or absent ; the vegetative function is less vigorous, and fat and cellular membrane is secreted instead of muscular tissue ; the mammæ are withered, the lungs are scantily developed, and not only is life less intense but less long, and early phthisis soon puts a period to the workings of so faulty an organism.

We may therefore conclude that the menstrual flux, being a sign of puberty, should not be regarded as a mere passive exudation, but the index of a general state affecting the frame largely.   This view is the more important, as it alone explains the phenomena of the disorders of menstruation, and points to that rational treatment, which is based not solely or mainly in the use of local stimuli for the mechanical attraction of blood to the uterus, but on remedies which, operating on the constitution, rouse and regulate those actions which constitute a function.

The developing and the sustaining this function depend it would appear on two circumstances ;—1, they require a series of constitutional actions in all their plenitude of vigour ; 2, there must be a healthy organ to which all these actions tend.   If either the one or the other be in fault, we shall have disorders of menstruation, springing either from constitutional or from local sources. Most frequently both are conjoined, or very quickly become so.

IMPERFECT PUBERTY.

1. *Precocious Puberty*.   The works of Haller, Meckel, and Meissner, contain examples of this state sufficiently numerous to establish the following general conclusions :—1, the signs of puberty may become visible at any period commencing shortly after birth, and extending up to the ordinary time of the regular developement of that function : 2, the majority of cases exhibit these signs in the third year : 3, the frame in general participates but partially in the impulse given to the sexual developement : the growth of the rest of the body never being on a par with that of the sexual organs : 4, the internal organs retain the type and textures of an early age, and soon exhibit the signs of premature decay : the ovaria are frequently diseased ; the external organs are rarely harmoniously developed ; the limbs are very short as compared with the trunk : 5, the mental faculties are in most instances obtuse, nay even deficient : 6, the individuals are short-lived.

In Haller's cases, amounting to upwards of thirty, and in those of Meckel and Meissner, there can be no doubt that the vaginal discharge was catamenial, as it was accompanied by all the marks of puberty.   In other instances, however, there is reason to believe that simple exudation of blood, per vaginam, has been quoted as menstruation.   Climate, heat, sedentary habits and a luxurious life, much and early excitement of the brain and emotions, irritation of the sexual organs, develope imperfect puberty.

Where the precocity is dependent on a misdirection of the vital force, it admits of as little medication as any other monstrosity of function and form. If there be that consent between the rest of the body and the function that there is the vigour and developement to meet the waste by the reproductive organs, early menstruation is not precocity.

Generally speaking however, this is not the case ; and the woman-infant pines and wastes under irritative fever marked by a rapid pulse, much nervousness, disturbed sleep, copious perspirations, languor of body and hebetude of mind, symptoms which are most intense, just before and just after menstruation.

The indications are, 1, to remove local excitement ; and, 2, to sustain the powers of the constitution.

The body during the period should be kept in the horizontal posture in absolute repose.   After this is over, all those remedies should be resorted to which are useful in certain forms of menorrhagia which are elsewhere detailed ; those

which repress the local action; those which bring up the debile and flagging frame to that degree of vigour which permits it to sustain the premature waste; and, in the majority of instances, this will readily ensue if the faulty education of mind and body, or the local ailments and irritations be remedied and removed.

2. *Tardy Puberty.* Puberty may be tardy as well as precocious, but the mere absence of menstrual flux is not a positive sign of the absence of the capacity of conception. Sir Everard Home relates the case of a young woman who was married before the age of 17, and who although she had never menstruated became pregnant. Four months after the birth of her child she became pregnant for the second time, and four months after the second delivery she was pregnant for the third time; after this she menstruated for the first time, and continued to do so for several periods, when she conceived for the fourth time. Kleeman mentions the instance of a woman who being married in her twenty-seventh year bore eight children before she menstruated; the periodical flux then took place and continued regularly till her fifty-fourth year. (*Rust. Mag.*, b. 18.) These and similar facts are to be regarded however as rare, and as warnings against unnecessary medication, for it is not the absence of the menstrual flux, but its absence when the general health is suffering that constitutes the case for medical aid. When tardy menstruation is the result of feeble constitutional power, the treatment is the same as for amenorrhœa, which is elsewhere detailed.

3. *Faulty Developement.* A class of cases answering to this head, may be collected from most of the better works on physiology and pathological anatomy. The individuals constituting it, termed androgynes, have the traces of feminine character, overpowered in the frame by those of a masculine kind, without any deviation, however, in the form of the sexual organs: the voice is rough, the mammæ undeveloped, and the thorax hirsute: there are the broad shoulders, the flat breasts, the narrow hips, and the beard of the male, with a portion both of his vigour and the harshness of his character; the internal organs of generation in these persons are small; they are sterile usually, and prone to phthisis.

Suspended Menstruation or Amenorrhœa.

1. The menstrual flux may be suspended in certain states of the constitution compatible with the healthiest condition of frame, as in pregnancy and during lactation; and here it is but an example of a very general law, that increase of the intensity of one function is accompanied by diminution of that of some other. It is not because the os uteri is closed during gestation that there is no flux, for it is in those who have borne many children, in many instances, quite open; and even if closed, the menstrual discharge might, like common hemorrhage, be contained to some extent between the membranes and the uterine walls; but it ceases to flow because the function of gestation suspends that of menstruation, suspends it, however, only in part, in the majority of instances. For it will be found that the periods at which the patient would have menstruated had she not been pregnant, are marked by a nisus, as it has been termed, which very sensibly affects her frame. All the sensations which precede the erruption of the discharge in the unimpregnated state, are felt in the impregnated, and, in some instances, even the discharge takes place periodically during the whole of utero-gestation. All abortions not caused by sudden injuries occur, for the most part, during what would have been a menstrual period, and all labours commence at one; both these conditions being determined by the *molimen ad menstruationem.* Hence the prevention of abortion depends very much on a knowledge of this fact, and on having recourse to that kind of treatment which shall allay at this period the periodical excitement, and regulate the actions

which tend to disturb the uterus. In those prone to abortion, who are of a plethoric habit, a few leeches applied at this critical moment, with the exhibition of a saline aperient, followed by a sedative, together with the horizontal posture and a spare diet, will ward off the evil of premature decay of the ovum. In the nervous and debilitated a different procedure is demanded; but these being subjects pertaining to the diseases of pregnancy, it is sufficient, in this place, simply to point out the fact of the influence of the function of menstruation, even on the impregnated state.

The suspension of the catamenia during lactation is scarcely remarked by any disorder of the frame. The incessant secretion of milk seems to have the same power of allaying, though more efficiently, the periodical constitutional excitement caused by the menstrual nisus, as when it is quelled artifically by bleeding or by purging. When, however, the flux appears during lactation, it may, in many cases, be augured, even though the nurse attempts concealment, by the effects on the infant, who is generally affected by vomiting, diarrhœa, or colic, and not unfrequently by convulsive fits. When a healthy nursling is suddenly and unexpectedly indisposed, the nurse should be questioned as to the catamenia, that the milk may be changed if requisite.

The suspension of the catamenia by organic disease takes place chiefly after such disorders as strike deeply at the nutritive process, such as chronic disease of the intestines or liver, phthisis, and in hydropic affections. In most disorders of the heart, and in ovarian dropsy, there is menorrhagia. In both these cases, the curative indications pertain to the original malady, and not to the disturbance of the menstrual function.

2. In practice we meet with two forms of *Amenorrhœa*, or obstructed menstruation, dependent on disorder of the reproductive function : the one attended with constitutional debility, the other with the appearance of superabundant circulation.

In the former kind the symptoms show, 1, a languid circulation; for the face is pale, the hands and feet habitually cold, the pulse small, weak, and if not quick, easily quickened. They show 2, muscular debility; for quick walking is followed by breathlessness, and exercise of all kinds soon fatigues. They show 3, torpor, or inequalities of the nervous function; the mind is lazy, and the spirits low and uncertain. They show 4, defective nutrition; for the body is lean, and the appetite bad. This state steals on the patient so insidiously that months elapse before medical aid is resorted to. The cessation of the menstrual discharge is very gradual. It usually is scanty or pale, and nearly serous, or defective both in quantity and in colour; then it becomes irregular, prior to its cessation : when allowed to proceed uninterruptedly, Amenorrhœa terminates in *Chlorosis ;* a state of constitution characterized by the following group of symptoms :—The complexion looks waxen or cadaverous; the upper eyelids are brown, while the lower are lead-coloured; the general surface of the skin is harsh and dry, and slightly suffused with a sallow bilious tinge; the stomach is the seat of unwonted sensations and diseased cravings; the bowels are at one time constipated, at another tormented with painful diarrhœa, the head aches under light and sound, and the mental faculties are altered; the breath is fœtid, the tongue rough and sulcated; the fauces pale, or striated with pencils of capillaries. There is œdema of the lower extremities in the evening, and of the face in the morning; together with such shortness of breathing, and so scanty a secretion of urine, as to lead to the suspicion that the lungs participate in the œdematous condition of the rest of the body. The very aspect of the patient is sufficient to prove the great alteration which the fluids have undergone, without our seeking support for the opinion from the authority of Dr. Marshall Hall, who has seen the epistaxic flow scarcely tinge the linen ; or from the theory of MM. Roche, Sanson, and Blaud, who fix the essence of the malady either in the deficient stimulant properties of the blood, together with an asthenic state of the vessels, or in the preponderance of serum. Whatever

theory we may adopt, whether that of Cullen, which makes the disease depen-
dent on some peculiar state of the ovaries, or that latter developement of it by
M. Gendrin, which connects menstruation with the formation and escape of an
ovule from the Graafian vesicle, or that of Dr. M. Hall, who traces it to " Dis-
order of the General Health," or to the opinions above quoted ; the practical
fact is this, that there is scarcely a single solid texture or a single fluid which
is not altered from its healthful condition.   The nervous and the vascular
systems, though not equally, are simultaneously disordered, and no organ
escapes from the pressure of much functional derangement.

In the second form of amenorrhœa girls attain to the age of puberty without
menstruating, or having menstruated cease to do so, and yet retain all the
appearance corporeally and mentally, of vigorous health.   The complexion is
florid, the frame well nourished and plump, indicating the probability of a local
cause for the deficiency of function.   The girls are subject to giddiness and
headache, a sense of fulness about the loins, and the general sign of plethora.
Many explanations have been given of this state, but though specious they are
scarcely satisfactory.   It is one of those many facts which are better known
than understood.   Some, in accounting for it, have asserted that the amenorrhœa
originated in the want of consent between the organ which secretes, and the
constitutional powers which prepare the fluid ; an explanation which is but
another mode of stating the same thing.   Others have accounted for the defi-
cient flux, by assuming some local inefficiency under the vague term of *rigid
uterine fibre*, which simply amounts to the expression of a belief that there is
some local obstruction neither definite nor intelligible.   Carus in his *Gynæ-
kology* has the following speculation : He says that a certain state of relaxation
is requisite for the performance of any secerning function, as evidenced in the
relaxation induced by syncope as being favourable to perspiration ; that caused by
fear in promoting the secretion of the kidneys and bowels ; while on the other
hand, where there is over-active vascular effort there secretion ceases, as in the
example of the vascular impetus of fever inducing the dry hot skin.   Now in
the amenorrhœa, accompanied by plethora, the deficiency in the secerning pro-
cess is dependent, or may be so, on the over-energetic action of the vascular
system.

This analogy may probably account for some of the forms of amenorrhœa,
but is insufficient for explaining the instances where sudden emotion in a healthy
person, not only suspends but suppresses for months the catamenia.

Complications.   To one or other of these two states very many local
ailments or special disorders are attached.   Their variety and intensity show
how deeply the function of menstruation influences the whole frame.

1. *Disorders of the vascular system.*   In the amenorrhœa of debility it has
been asserted by Dr. Marshall Hall, Blaud, and indeed by the majority of
authors, that the brunt of the malady falls on the blood, which becomes so
altered as to present but few of its healthy characteristics.   Chlorosis, therefore,
may be looked on as a deficient hæmatosis.   Whatever be its origin, this is one
of its most important results.   The want of the due stimulus in each organ is
followed by all those reactions which succeed great losses of blood, and which
are admirably described by Dr. Marshall Hall.   There is intolerance of light
and sound, and an aching brain, confusion and even delirium when the head is
affected.   There are sudden attacks of what appears to be pleuritis or pneumonia,
as far as dyspnœa and pain are concerned : often the chest suffers, or there is
exquisite tenderness of the peritoneum if this organ be affected.   In all these the
suddenness of the attack, its liability to shift or to cease, the previous history,
the relief afforded by opiates and nervines, with depletion merely as accessary,
point to the real nature of these attacks.

Besides these diffusive affections, defective hæmatosis, accompanied as it
always is, by all the signs of deficient nutrition in the solid structures, is fol-
lowed by a weakened state of the heart and blood-vessels, deserving of great

attention. Most unexpectedly these patients will fall down apoplectic, and effusion of blood or serum will be found in the brain, and the heart thin and pale.
The defective state of the organ, and its inefficient propelling power, give rise to
congestions, inasmuch as the blood is not forced back into the heart. The blood-
vessels lose their elasticity, and become passivly distended. Hence the liver is
gorged, and the motions tinged with exuded blood; hence the anasarca of the
extremities.   There are in these cases very remarkable modifications of sound,
heard on auscultation. The valvular sounds of the heart are those of deposit
upon, and contraction of these parts, while the peculiar droning noise, known as
bruit du diable, may be heard in the course of the large veins.

It is wonderful how readily this state of the vascular system is remedied by
steel, and how speedily the heart regains its force under the treatment rigidly
enforced for anæmia, namely, light and digestible animal diet, much fresh air,
regular foot exercise, wine and steel. M. Blaud has stated that similar condi-
tions of frame are remedied on an average in three weeks.

There is a different form of modification of vascular disease which we will
venture to term *congestive amenorrhœa*, in which the capillaries are chiefly in
fault; and that, not from any defect in the heart, or great vessels inducing
mechanical distension, as in the last case. The patient's fingers are patched
with purple as affected by chilblains, or, what is as common, the leg is covered
with fine vessels. The surface so affected is hot and dry and painful, and hence
the patient is more or less lame; sometimes there is exudation of black blood
under the skin, which soon peels off, leaving a thin pellicle of dried cruor which
falls away, and exposes a red and painful surface. This state of the leg, for it
rarely affects the upper extremities, may last for several months. It is always
worse when the periods should appear, and becomes an index of the constitu-
tional effort. We have in many instances found the patients, so affected, perish
of phthisis.

2. *Disorders of the digestive organs.* Besides the general disorders above
mentioned, the stomach is very often the seat of peculiar uneasiness, noted by
the patients as indescribable; sometimes they attempt to liken it to pruritus,
sometimes a sensation of sinking and exhaustion. With these states, the appetite
is variable, or there is a disordered longing for inedible substances, such as
sealing-wax, brown paper, coal, chalk, slate pencil, and even dirt.

Another state of the intestinal canal accompanying amenorrhœa, is its partial
distension in the neighbourhood of the uterus, so that the abdomen has the exact
shape of pregnancy, while the morning sickness, capricious appetite, together
with the cessation of the menstrual discharge has not unfrequently led the prac-
titioner into a belief that such might be the fact. This class of cases may be
detected by an accurate knowledge of the signs of pregnancy.

3. *Spasmodic affections of the involuntary muscles.* The whole of the intes-
tinal tube, from œsophagus to rectum, may be the seat of spasm. In its severest
form we have the very acute disease known as *hysteric colic*, in which, with intense
abdominal agony, we observe great, though temporary disorder of the mental
functions.   A milder form, and a very common one, is marked by great irrita-
bility of the canal, with much rumbling of wind, and sometimes with incessant
noise, as if of the splashing of water. The œsophagus may be spasmodically
affected, forming *hysteric dysphagia.*

These spasmodic affections may occasionally attack the heart; when in a mild
form there are various grades of distress, from simple palpitation to severe
angina. In a severe form the patient will be suddenly killed, as the following
case, detailed to the writer by Mr. Green, of St. Thomas's Hospital, proves :—
.A young lady who had for some time been hysterical was attacked by peritonitis,
from which she was not relieved by depletants ; the pain subsided spontaneously,
but soon after cerebral disorder arose ; one day she exclaimed suddenly that
flames were rushing to her brain, and fell down dead. On inspection, it was
found that the cerebellum was pale ; the cerebrum and its membranes slightly

injected; the right side of the heart was completely gorged with blood. On the left side, however, not only was the ventricle quite empty but spasmodically contracted, and this was looked on as the active cause of death. A rope of mucus hung from the os uteri. The Fallopian tubes were dark with black blood; several Graafian vesicles were ready to burst; the hymen was entire.

A case of a similar kind is mentioned by Dr. Bright; the source of irritation, however, was a calcareous deposit on the fimbriæ.

4. *Spasmodic affections of the voluntary muscles.* These are not uncommon accompaniments of functional disorder of the uterus. They are enumerated here, not because they invariably accompany amenorrhœa, for sometimes the mere discharge is wanting, but because they are obviously connected with the constitutional nisus at the period, for these are the times when they are either aggravated or called into existence. The muscles of a limb become and remain contracted in so great a degree as to be forced into the most constrained and unnatural positions. In others, a larger section of the muscular system is subjected to spasmodic action. In one instance that came under our care, the shoulders were for months spasmodically drawn up to the level of the ears, and such was the whimsical sensibility of the nervous system, that the limbs were involuntarily jerked out at the sound of street-music. In the majority of these cases, together with excessive irritability of the muscle, there is positive lesion of the faculty of volition, which prevents them from vigorously willing an act. Some require the shock of terror to force them into necessary exertion. There often is difficulty in evacuating the bladder, and the rectum.

Chorea, or St. Vitus's dance, the most general disturbance of the muscular system is rather a precursor of puberty than a common complication of amenorrhœa. It is, however, very often connected with functional disturbance of the uterus; for, of its subjects, three-fourths, according to Heberden, are girls between the age of ten and fifteen, the disease yielding with the establishment of the menstrual function. The nervous excitement and vascular erythism which arise during the developement of puberty, are the conditions most favourable for inducing chorea: hence, in those rare cases which are fatal, the heart is either inflamed, or there is apoplexy or fatuity, or softening of the spine. (*Med. Gaz.* 1831.)

5. *Affections of the nervous system.* Besides those affections of the great cavities of the body which simulate pleuritis, peritonitis, and frenzy, the limbs and joints are subject to acute and chronic forms of pain, which seem to portend disorganization. In some the bone is the seat of pain, likened to that caused by the gnawing of dogs; in others the joint exhibits the signs of ulceration; in a third class the painful affection resembles, in its agonizing effects, tic douloureux, and the knife has been resorted to, where steel, in a less formidable shape, would have been the more beneficial remedy.

The mind may be, and generally is, disordered in its faculties or emotions, in most cases very slightly, in others in a more marked form. Of the slighter grades, mere irritability may be carried to such an extent, that a hitherto happy home is broken up from intolerable captious caprices. Of the graver kinds of lesion, the most common forms of functional aberration are met with: 1, as disordered instincts or appetites; 2, diseases of some of the intellectual faculties.

Of the first kind, we have already noticed disordered appetite, impelling the patient to swallow greedily the most nauseous substances. Of emotions, the commoner forms of aberration are exhibited in causeless dislike, or vehement and sudden affection towards individuals, who have neither provoked the one nor invited the other.

In some instances it is impossible to account for the insane gratification arising from disorder of emotion.

One of our most reputed physicians was called to see a young lady who vomited large quantities of urine. He was informed by the patient, and by her attendants, that the only remedy for this strange misplacement of function was

bleeding, but that this had been so often done that it could not without danger be continued, an inference readily made from the blanched cheek and feeble pulse of the patient.

The consulting physician at once declined acceding to the urgent entreaties of the girl, who accordingly soon vomited large quantities of a fluid which was proved to be urine by a celebrated chemist. The patient was ordered to be watched night and day, no bleeding being allowed; when it was soon ascertained that the kidneys performed their functions regularly, and that the bladder became so painfully distended in the usual time, as to cause the patient to request the ordinary relief.

She confessed that she had deceived her medical attendants, solely to induce them to bleed her, adding that the operation was attended with indescribable pleasure, and to insure this, she swallowed her urine, so as to impose on them more readily with her incredible tale.

A not uncommon form of aberration of emotion is a diseased desire for sympathy or wonder, and rather than not be the sole objects of attention, these monomaniacs carry on with great ingenuity a long series of frauds. In one instance the patient nearly fell a victim to this diseased passion, pretending total inability to eat. When reduced to a skeleton, when neither any sustenance was ever known to have passed her lips for weeks, nor any evacuation of the bowels discovered, it was determined to try the efficacy of a stream of cold water on the head, in arousing hunger, while a basin of hot soup was at hand to gratify it, should it arise.

The patient resisted the shock the first day. On the next, when the bucket was larger and the dash threatened from a greater height, a very little soup was asked for on trial, which was not found intolerable, and from that hour the rebellious stomach soon regained its powers.

6. *Affections of the intellectual faculties.* We have seen two forms of mania accompanying menstrual disorder; the one constant, the other intermittent. The constant form differs in no essential from mental aberration, arising from common causes: it has all its varieties of delusion, whether of exaltation or depression. In the intermittent form, the patient is maniacal only during the time of the discharge, the mental disorder beginning with the eruption of the menstrual flux, and ceasing as this subsides. In a few instances, the return to sanity was incomplete, so as to be rather remitting than intermitting mania.

Both the constant and the intermittent forms differ, however, in one important feature, from mania arising from other sources, viz., on the essential point of curability. There are but few examples in which mental disorder, dependent on menstruation, has not been cured in our experience. The intermittent form, however, may last several years, and is less tractable than the constant.

There are other and rarer affections of the nervous system called forth by menstrual disorder, which we shall simply enumerate. 1. Ecstasy, or motionlessness depending on intense mental exaltation. 2. Catalepsy, or loss of volition, in which action is solely dependent on mechanical causes, externally applied. 3. Trance, or lesion of the functions of animal life. 4. Somnambulism, or intense sleep of some of the senses and faculties, and intense wakefulness of others, the phantasy being possessed by a vivid dream. 5. Anomalous action of the senses, as hallucinations, visions, affections determined by particular odours or certain sounds.

Treatment. In amenorrhœa attended by debility, the best way to excite the uterus is to strengthen the constitution, and the best remedies are such as improve the general health. As there is almost always in these cases disorder of the digestive organs, the treatment should commence with a brisk mercurial purgative, followed up by a course of warm aperients of a milder kind: two grains of calomel, and four to eight of scammony, may be given once a week and the aloetic pill on the other days. But the chief remedy for a radical cure is steel in some of its various forms.

The difficulty experienced by most patients in tolerating this medicine arises from the extreme susceptibility of the nervous system, which causes the exhibition of steel to be followed by headache, a sense of fulness, bleeding from the nose or even from the lungs, and a wearing fever.

There are, however, two modes of exhibiting this remedy, by which these inconveniences may be obviated: the one is to combine the steel with an aperient, the other to begin with the minutest doses. M. Blaud says that the carbonate of iron is the most efficacious form, and that on an average amenorrhœa is cured by it in 21 days.

The muriated tincture is the strongest, and the vinum ferri the weakest, of the preparations of iron. The course of steel should be carried on for eight weeks, omitting the period in which the patient should have been unwell, and during which the attentive practitioner will remark the constitutional disturbance created by the nisus. During the whole period of using chalybeates, an aperient of Dec. Aloes Comp. variously modified should be used; and if the biliary system be in fault, mercurial alteratives conjoined with iron (Plummer's pill and compound iron pill) will be found of singular use. The invigoration of the constitution may be furthered, 1, by diet; the food should be the lighter kinds of meat proportioned in quantity to the powers of digestion: 2, a moderate use of wine: 3, exercise, so as to keep the patient as much as possible in pure air, yet not so as to fatigue and waste her strength: foot and horse exercise are preferable to carriage: 4, a residence in the country away from the wearing excitements of a town life: 5, bathing, shower bathing, at first with warm, then tepid, and at length with cold water; in cases of great debility simple sponging is sufficient: a cautious use of sea bathing.

In the plethoric form of amenorrhœa, marked by signs of a disturbed circulation in an otherwise healthy frame the treatment required is precisely the reverse to that which has been just noticed. The uterus must not, as in the former case, be stimulated, by filling and stimulating the system. The indications are, 1, to use such agents as act on the uterus without stimulating the constitution: 2, to relieve the general or local plethora, until menstruation takes place.

Under the latter indication, blood should be abstracted in small quantities from the arm, especially at the expected period. Should this be objected to, blood may be abstracted from the loins by cupping, or the application of leeches, and the aperients should all be of a saline nature producing watery evacuations. In those who are subject to periodical hæmorrhages, we have found that these may be commanded by a draught of two ounces of the infusion of roses, two drachms of salts, and twenty minims of the tincture of hyoscyamus, to be taken every night, for a few days just anterior to the expected attack, which as before remarked, will be when the menstrual flux should have occurred.

The diet should be spare, and wine and fermented liquors proscribed. In some obstinate cases of plethoric amenorrhœa, a milk diet will be found very beneficial.

For exciting the action of the uterus, the chief means are the following: they apply to both forms of amenorrhœa;—1, warm hip baths, and especially at the expected period; they should be used for half an hour at least: 2, aloes, and such medicines as stimulate the rectum, and excite sympathetically the uterus: 3, supposed emmenagogues, such as hellebore, savine, and electricity; the last is the best of direct applications.

There are numberless nostrums of greater or less value, which, from their very number, prove how capricious a disease is amenorrhœa, and how curable. Dale excites the mammæ, by repeated application of one or two leeches; the organ enlarges greatly, and the uterine sympathizes on being thus aroused. Very many authors give five to eight grains of ergot. Carron des Villard recommend scyanuret of gold in minute doses: Bradley gives strychnine: Brera, iodine: Amussat applics an exhausted glass to the uterus: and Rostan leeches.

It is impossible to give a sketch of the treatment of the various complications

of amenorrhœa which, though rooted on the general malady, form specific dis-
eases requiring the specific treatment which is detailed in other places.

Obstructed menstruation may depend on local conditions of the uterus. After
menstruation has been thoroughly established, it may be and often is suddenly
suppressed in a healthy woman, not pregnant, by various causes, of which the
most distinct in their effects are cold and mental emotion.   When menstruation
is interrupted by cold or fright, it may be either near and is prevented, or has
commenced and suddenly stops; in both cases there ensue symptoms indicating
more or less distinctly an inflammatory state of the uterus, and the usual sym-
pathetic disturbance in the constitution : there is fever, nausea, or vomiting,
tenderness of the abdomen extending down the thighs, a quick pulse, hot skin,
and throbbing headache. In the severest forms, we have known death produced
in a few days, and inspection has proved it to have been brought about by phle-
bitis.   In a milder form it may terminate in chronic enlargement of the uterus,
or in a condition of the uterus unaccompanied by any sensible disease save of
want of discharge.   The treatment for acute suppression is the same as for
phlebitis, viz., general or local bleeding, warm applications, mercurial aperients
followed by sudorifics.   For chronic enlargement, the remedies which apply to
chronic metritis are beneficial here, as mercurial alteratives, repeated leeching,
frictions of tartarized antimony, &c.   When there is amenorrhœa, which in
these instances is termed chronic suppression, it is accompanied by one or other
of the two states of constitution already noticed, and demands for its cure the
remedial measures already discussed.

Menstruation may be mechanically obstructed by any malformation impeding
its egress.   The impediment may exist in any part of the vaginal canal, from
the external orifice to the occlusion of the os uteri.   There is a swelling of the
abdomen or of the perineum, or of both parts, according to the site of the oc-
cluding membrane.   There are at first symptoms of periodical colics with much
pain, very similar in character to those of labour; to these succeed increased
size of the abdomen; after which the signs of absorption of morbific matter into
the system, viz., hectic or irritative fever, wasting, delirium, dusky hue over the
surface, great debility, and death.   The uterus and vagina are found distended,
sometimes enormously, with the menstruous fluid in various grades of alteration.
In Mr. Friar's case thirty ounces gushed out on the first incision.   (*Med. Facts
and Observ.*, vol. viii.)   In Dr. Sherween's, twelve pounds were evacuated.
(*Duncan's Med. Com.*, vol. ii.)   In the former instance the discharge was
quite liquid; in the latter, ropy and of the consistence of treacle; in others the
watery particles have been still more absorbed, leaving a gritty deposit in utero.
In a few cases the matter was putrid, although secluded from atmospheric air.
In Dr. Sherween's case the patient must have been menstruating internally at
least fourteen years, in Dr. M'Kormich's about seven.   (*Duncan*, l. c.)

There are cases in which the vaginal canal is imperforate without being ac-
companied by any of the disorders just described.   The obvious and indeed the
only remedy is the knife, and the sole practical question is, What are the cases
fit for it ?

A patient in the prime of life consulted Morgagni for an imperforate vagina.
She said she had never menstruated, had never been subject to lumbar or dorsal
pains, and it was obvious that her general health was good.   Morgagni found a
septum about one-third up the vagina, closing the canal.   His reasonings on
the propriety of an operation may be taken as presenting the particulars for
judgment in all similar cases; it is eminently sagacious and practical :—
" Having considered all these things, and hearing, not only that this woman
had never had menstrual discharges, but not even any uneasiness nor pain tend-
ing thereto, nor even the slightest beginning of them ; and, on the other hand,
seeing that she was endowed with very good health, colour, and strength, as
every healthy woman is at that time of life, which may be considered as the
prime, I began to suspect that, as she was without a continued and open canal,

or orifice of the vagina, she might be perhaps, without a uterus from the original formation ; so that if the obstacle could even be removed with the scalpel, there would nevertheless be danger, lest the bladder or some one of the intestines, lying in contact with it, in consequence of the uterus being absent, should be pierced through at the same time. I therefore persuaded this woman placidly to suffer her marriage to be dissolved, which had been improperly contracted, rather than imprudently submit to the operation." (*Let.* xlvi. art. 2.)

Of this species of malformation the examples are sufficiently numerous. Where the uterus is wanting, the ovaria and Fallopian tubes are also absent, the place of these organs being supplied by a cylindrical mass, from one to three inches long, and one inch thick, or by a closed sac. (Meckel, *Path. Anat.*, b. i. p. 59, &c.) There are examples of operations attempted and discontinued. Thus Nabothus mentions, that " a physician attempting to remove with a knife a coalition of the vagina which had been from birth, was obliged to desist when he saw the coalition extending very high and the large vessels appearing, and his opinion is, that when there is a fleshy interstice, it is better to abstain from the incision of it, partly on account of the very great hæmorrhage, and partly on account of the subsequent inflammation."

Denman was consulted in a case of imperforate hymen. He advised the friends of the patient to allow the menstrual flux to collect, and thus let nature herself demand the operation, and at the same time show the best point, at which to make the incision. From these, and similar facts, we may conclude that not every case of imperforate vagina is fitted for operation ; that especially we should hesitate if there never has been any sign of menstrual excitement in the system ; and if in the frame there be the signs of absence of the ovaria and uterus, as flatness of the mammæ, &c., and the other characteristics of sexual deficiency which have been enumerated. On the other hand, if there has been a succession of attacks occurring at the end of the ordinary menstrual intervals, if there be a tumour above the pubes or at the perineum, we are called on to advise an incision. If the imperforation be near the orifice of the vagina we may always operate ; if higher, care is demanded ; and if very high, we should be quite certain that there is a uterus, and that the incision or puncture be in the direction of that viscus. If the operation be postponed until the general health shall have suffered, the chances of recovery are much diminished.

Whenever the contained fluid is much altered, the uterus is not speedily evacuated ; and then the secretion is apt to become putrid on the access of air. Much of the success of the operation depends on relieving, by repeated injections of warm water, the uterus from the contact of the matter. In some instances the uterus has suffered irreparable mischief from ulcerative disease of its inner tunic.

VICARIOUS MENSTRUATION.

For instances of this curious subject the reader may consult Sauvages, Cullen, and Mason Good, in their several works on Nosology. Numerous examples are scattered, also, among our periodicals. We have known the vicarious discharge to occur from the lungs, the stomach, the rectum, and from sore surfaces of the skin. The fluid differs from the true menstrual discharge in being common blood, but authors have noticed differences of aspect and odour which have assimilated the secretion from the vicarious surface with that of the uterus in a greater or less degree of affinity ; nothing positive on this point, however, is made out. Authors have enumerated examples of vicarious menstruation from the eye, ear, nostrils, stomach, intestine, sockets of the teeth, lungs, mammæ, bladder, and skin. It is probably that it is always or nearly always determined to a mucous surface as giving an outlet.

The treatment is regulated by two indications : 1, to excite the uterus to

resume its natural function; 2, to guard the organ which is burdened with this unnatural effort. Bleeding just before the expected attack, to the amount of about four to eight ounces, and purging with saline aperients a week prior to it, will convert the case into one of amenorrhœa, or greatly moderate the vicarious afflux to the organ unwontedly labouring, while the known means of exciting the functions of the womb may be resorted to in the intervals.

In the cases of vicarious Hæmatemesis or Hæmoptoe which have fallen under our observations, the lungs and stomach were either diseased or ran the hazard of being left so. The specific treatment will vary according to the organ attacked, as that determines the kind of reaction caused by the irritation. The greatest risk to life is undoubtedly from vicarious Hæmoptoe, and yet by the plan of moderate purging just anterior to the monthly period, the patient survived three years with comparatively slight expectoration of blood; at the end of which time, having died, we found one lung contracted into small dimensions from an old pleuritic attack, but without any signs of tubercle on either side.

The state of the organ had probably assisted in determining the discharge to it, just as when the skin is ulcerated the vicarious flux will be seen to exude monthly from the diseased rather than from the sounder surface.

PAINFUL MENSTRUATION, OR DYSMENORRHŒA.

Symptoms. Pain in the loins, commencing a few days before, or just previous to, the menstrual eruption. The umbilicus and the pubic region are tender on pressure, and most ease is obtained by the recumbent posture. These pains vary in their character and intensity, from constant soreness to agonizing dartings or colics: they are mostly remittent. The stomach and bowels are rendered irritable, there is vomiting, or diarrhœa with tenesmus, and the urine is generally passed with scalding pain. In the more severe forms the nervous system gets much disordered, and either syncope or hysteric convulsion, or even catalepsy may occur. These symptoms increase in intensity until the eruption of the menstrual flux, and then suddenly or gradually cease, or simply decrease. The flow of blood is often scanty, but by no means always so.

Causes. No defect nor organic lesion is discoverable even in the most severe forms of Dysmenorrhœa. That the malady is connected most intimately with the menstrual function, is apparent from the fact of its never affecting the female, either before puberty or after the cessation of the menstrual function, and from the consideration that it is always during the period that it subsists. Dysmenorrhœa has been divided by many authors into inflammatory and neuralgic; and to these two varieties, Dr. Churchill in his Work on the Diseases of Women has added a third, viz., that dependent on mechanical impediment to the menstrual fluid. While we acknowledge that in a certain number of instances the vascular system is chiefly in fault, as in others the nervous functions are disordered; while we would lessen the impetus of circulation in the former, and adopt, very often, contrary measures for the latter, we are by no means satisfied that true inflammatory action constitutes any part of Plethoric Dysmenorrhœa. What would be the state of an organ which for years laboured four or five days, in every twenty-eight, under the violent symptoms supposed to be inflammatory dysmenorrhœa? we have no instance of any other viscus of the body so suffering without accession, sooner or later, of disorganization of its texture, and yet such a termination rarely or never is the result of dysmenorrhœa. Again then, this supposed inflammation, not only after repeated attacks does not disorganize texture, but is remittent in its action. If it is not an inflammation *sui generis*, it must be compared with other diseases, such as gout and rheumatism, which attack organs from time to time at distant intervals, but with these maladies the analogy also fails in the main point, namely,

that they, unlike dysmenorrhœa, disorganize texture. We prefer therefore the not involving ourselves in the theory which the term Inflammatory Dysme- norrhœa implies, and the rigid practice it should induce.

It is true that a not uncommon effect of dysmenorrhœa is the forma- tion of coagulable lymph, modelled to the shape of the inner surface of the uterus : this has been supposed to be the effect of inflammatory action. Prac- tically, perhaps, it is safer to consider it as the result of irritation, for anti- phlogistic remedies are not in every case the best for preventing its formation. It should also be remembered, that the uterus is especially organized to pour forth lymph under certain irritations of the internal organs of generation, as when conception takes place, whether that be uterine or extra-uturine, the inner surface of the womb is lined by the plastic fluid. Whatever be the analogy between this action and that of inflammation, the diversity is still greater ; and, unless we are prepared to say, that metritis and pregnancy are convertible terms, we are warranted in placing the single phenomenon of the effusion of lymph, common to both states, under different causes. We are inclined to believe therefore that the membrane formed in utero, in some instances of dysmenorrhœa, results from a local condition, which may practically be more safely designated irritation than inflammation ; and that, as in the ovary serous cysts are more readily formed than in any other part of the body, from a devia- tion of the natural functions of that organ, so spurious decidua is more readily deposited in utero under certain irritations from a deviation of its functions. The readiness with which either the uterine membrane, or the ovarian cyst is formed, being deducible in both cases from the natural tendencies of either organ.

The exciting causes of dysmenorrhœa are many, but in general all such as excite the nervous system, more especially such as exalt the sensibilities of the uterus. Thus the emotions of terror or joy, coincident with the menstrual period, have been known to produce dysmenorrhœa. Thus too the venereal congress, immediately previous to the expected flux, has excited the severest forms of this malady. In other instances, causes which have lessened the dis- charge suddenly have produced a state of uterine sensibility, which has termi- nated in dysmenorrhœa.

The *prognosis* is favourable, as to danger to life : as to sterility, it is not unfavourable ; though they who are severely affected do not readily conceive, and when they do so are prone to abortion. As to curability, the majority are cured. There are a few, however, who resist all the known means of alle- viating the intense suffering incident to the malady, and are relieved only when the function of menstruation ceases.

Treatment. As in most of the maladies of menstruation, the treatment requisite is applicable, 1, to the period, 2, to the interval between two. During the periodical attacks the pain may be relieved in various ways. Just before the eruption of the menstrual flux, when symptoms of plethora are present, one of the most efficacious means of lessening pain is local depletion, which may be resorted to by means of leeches or the cupping-glass. The case however should be recognised as decidedly one admitting depletion; with or without this, the appearance of the menses should be solicited by tepid, or hot, or vapour baths, for generally speaking, a marked amelioration takes place, when the flow from the uterus is established. The great remedy, however, in lulling excessive pain, is opium, and in cases of real anguish a full dose should be given and repeated. We have found a mixture of laudanum, and tartarized antimony in minute doses, frequently repeated, of singular benefit. We have also used stramonium with the most marked good effects in the more severe forms of dysmenorrhœa. Colchicum, in our experience, is not equal either to opiates or to stramonium. In general, then, we may say, that 1, anodynes, 2, depletion, and 3, warm local applications, are indicated in the paroxysms of dysmenorrhœa ; and that these may be combined, or separately used, according

to the nature of the individual case. The acetate of ammonia has been much lauded by M. Patin ; ergot of rye has been found beneficial ; and there are but few practitioners who have not some remedy, or combination of remedies, supposed to be efficacious in removing the distress of this malady ; a proof that the paroxysm subsides spontaneously, or that it is in the majority of cases easily remediable.

During the intermenstrual period, the chief remedy to be relied on is a course of steel. Here, as in all the functional disorders of menstruation, it is a most valuable medicine for producing the radical cure. Where the patient exhibits the neuralgic form, it may be at once proceeded with. Where there are signs of a disordered circulation, this should be regulated by bleeding or cupping, and a bland unexciting diet, and then the steel will usually effect a cure in two intermenstrual periods. With respect to the treatment of the variety of the dysmenorrhœa, dependent on mechanical impediment, Dr. Churchill recommends dilatation of the narrow orifice of the uterus by a bougie, and cites an instance supporting the efficacy of the treatment. We are not prepared to admit the existence of the form of the malady mentioned by him. It is difficult to trace the connexion between the effect alleged and the cause assigned. Obstructed menstruation acts by distending the uterus, and so exciting labour pains. The mere narrowing of the os uteri would not interfere with the exit of the fluid, slowly as that fluid is formed during the menstrual period, and therefore would not, we believe, cause accumulation in utero. If it did, the symptoms should be referred to obstructed menstruation, a totally different malady from dysmenorrhœa, having nothing in common with it but the fact of painfulness.

The remedy recommended by Dr. Churchill in his elaborate and useful volume, namely, the introduction of a bougie, would be in our opinion beneficial in many cases of dysmenorrhœa, not however as removing obstruction, but as altering the action of parts, just as many states of irritable urethra in the male are cured by catheterism. However, the objection to the use of a similar means in the female, considering the age in which the malady is most rife, is all but insuperable.

EXCESSIVE MENSTRUATION, OR MENORRHAGIA.

We include under this term only those uterine hæmorrhages which are directly or indirectly connected with the periodical flux, omitting such as arise as a symptom of uterine structural disease. The quantity of blood discharged at each menstrual evacuation varying in different women, menorrhagia exists only when there is disproportion between the loss and the power of replacing it. If with the usual daily flux the periodical returns be shortened, or the time of the flux be lengthened, or if there is a larger quantity evacuated, although neither the interval between the periods nor the duration be altered : we have menorrhagia. It is the relative quantity lost, and not the absolute, which constitutes the disease. An abundant menstruation must not be confounded with a disordered one. The former retains its periodicy, its quantity, and quality, and does not deteriorate the general health. The latter is irregular, and leads to disease.

Causes. Heated rooms, too warm clothing, warm bathing in excess, are all known to determine to the uterus. In the tropics menstruation is not only early but copious, while in the frozen zones the discharge is both late and scanty. Mechanical irritations, excessive venery, some of the pathemata, as fear or anger, are predisponents to uterine discharge. Various diseases, especially those which interfere with the free circulation of the blood, as diseases of the heart, asthma, and such as affect the circulation in the vena portæ, also diseases of the ovaria, uterine polypi, are mostly followed by menorrhagia. In some affections of the fluids, purpura for example, the drain from the uterus we have known occasion

death. In some anomalous irritations of the ovaria and Fallopian tubes a similar event has occurred. The late Mr. John Shaw examined a young lady who, while in full health, was suddenly seized with menorrhagia accompanied by a succession of fainting fits, under which she succumbed. A large mass of coagula was found in the abdomen, but the source of the hemorrhage was a mystery until the Fallopian tubes were laid open, and then it was discovered that, for the space of about an inch and a half of one of them, its lining membrane was pointed with bloody spots from which the fluid found in the peritoneum had rapidly been poured out. These kind of hemorrhages are essentially similar to those from the membranes of the brain or nostril, or lung, in which mechanical lesion of the blood-vessels is rarely found. Certain kinds of exercises, as equitation, mechanical impediment to the free circulation of the blood, such as that which is caused by tight lacing, will give rise to menorrhagia or increase the tendency to it.

In nervous women emotion will very speedily determine a menorrhagia of a very terrific character. Latterly, M. Trousseau (*Journ. des Connaiss. Med. Chir.*, Dec. 1838) has assigned chlorosis as one of the causes of menorrhagia. The blood he says is altered and attenuated by menorrhagia in the first place, and this attenuation, in its turn, becomes a source for furthering the flux. He remarks that this cause is a common one in married women, and uncommon in virgins. In twelve cases nine of the former class were affected to three of the latter.

With regard to the *symptoms*, there is the prominent one of excessive discharge followed by the consecutive effects of loss of blood on the constitution. The natural menstrous secretion becomes mixed with large clots; there is in many signs of increased activity in the uterine circulation, a sense of heat and weight, and throbbing. These signs usher in the discharge, and are its precursors. There is a sense of pressure in the pelvis, feverishness, irritability, and an uncertain state of the digestive organs, vomiting, and constipation, or diarrhœa. If during this state of the disorder the uterus be examined, it will be found turgid and considerably enlarged, and in chronic cases the finger is smeared with blood which stagnates in the texture of the womb.

The *prognosis* varies according to the cause: where there is a healthy uterus and no peculiarity in the constitution, the vast majority of persons affected with menorrhagia recover. Where, however, there is uterine irritation or disease, or where the flux is dependant on the state of the heart or lung, the probable result must be determined by the aspect of the primary malady. In chronic cases the constant loss of blood brings the constitution into a state very favourable to the developement of any acute general disease, or for disorganizing the uterine texture.

Forms of Menorrhagia. There are two forms, the *acute* and the *chronic;* the former occurs with all the symptoms we have noted, and with complete intermissions. The latter is marked by constant oozing rather than gushing of blood, by the signs of general debility rather than of fever and hurry of circulation, and by a deeper disorder of the general health as well as of the uterine tissue. The occasions in which menorrhagia is most common are, 1. It is very generally coincident with the menstrual period; when it is not, either it is dependent on some uterine malady, or on some impediment to the general circulation; or it is the result of the nervous temperament put into violent emotion. 2. It occurs as a sequela of parturition. The natural congestion after childbirth is a strong predisponent to excessive uterine flux, and repeated abortions and pregnancies determine very decidedly to the vascular system of an organ whose anatomical structure is already favourable to hæmorrhage. 3. It occurs as a symptom of the perturbations of what has been termed the critical age. The suspension of uterine function is preceded by irregularity of menstruation, both as to time, and as to quantity of discharge. 4. It occurs after undue lactation. 5. It occurs anterior to puberty. 6. It is symptomatic of many

diseases. When the flux cannot be traced to obstruction of the circulation, or to any visceral or general malady predisposing to hæmorrhage, we must look on it as dependant on a cause which, under the vague term of irritation, appears to have its seat in the nervous system. The most obvious example of which, and the most familiar, is the suffusion of the cheek by the emotion of shame or its blanching by the passion of fear. Here we see how the nervous power directs the flow of blood unequally to certain tissues, while the more mechanical impulse of the heart, however strong, could only pump it, in the largest quantities, where the recipients for the fluid were of the amplest calibre.

In certain exanthemata, perhaps in the erythema of gout, in many shifting erubescences of the surface, this effusion becomes more permanent, but still retains its connexion with the afflux of irritation rather than that of inflammation, by its not changing the structure of the part injected. By thus looking through vascular movement, we are enabled to trace a gradation of disease from simple and transient distension of the capillaries, to alterations of structure accompanied by effusions of fluid in the form of blood, or its constituents, or of new combinations arising out of those endowed with specific powers. In this view, however, medicine has rather seen the chain than proved its linking, for great gaps in the continuity of our knowledge are felt.

Menorrhagia unconnected with structural disorder, whether uterine or not, is chiefly found in two kinds of constitution : the nervous, and what may be termed the lymphatic. Although stated as existing in those in full vigour, our own experience affords us few examples of the robust being menorrhagic. In the nervous temperament, marked by extreme mobility in all the sensations and emotions, characterized generally by rapid muscular movement, and a thin frame and pallid surface, the gushes of uterine hæmorrhage follow agitation of all kinds, and are incredibly great. The wonder has been, how they were consistent with any health. In the second kind of temperament, which we have termed the lymphatic, the persons are disposed to be bulky, and even florid, but they have no muscular strength : they are readily tired, and the capillary circulation almost stagnates in bright red patches in the cheek, or pencils the skin of the limbs with a slender vascular fringe. These persons faint on small abstractions of blood, and are much exhausted by the periodical flux.

Treatment. There are three circumstances which modify our views in treating menorrhagia : 1, whether it be simple : 2, whether it be dependent on some visceral or some constitutional malady : 3, whether it be connected with uterine structural disease. If simplicity of arrangement were always most useful, we might reduce these to two, by ascertaining whether the flux was idiopathic or symptomatic. The three questions, as above stated, lead more directly, however, to a definite conclusion, and therefore to more precise remedial action.

It is to simple or idiopathic menorrhagia that the following rules of treatment are especially directed, although they are not inapplicable to the symptomatic with some modifications.

The first thing to be attended to in menorrhagia, whether acute or chronic, is absolute repose in a horizontal posture. From a known law of hydrostatics, namely, that the pressure of fluids is as the height of the column and not merely as the quantity of liquid matter composing it, it is certain that the pressure of a column of blood, extending from the heart to the uterus, must be greatly lessened by placing the body horizontally. The pressure is in fact reduced to that of a column of blood whose height is that of the diameter instead of the length of the containing vessel.

Accordingly we find that in the majority of cases of incipient acute menorrhagia, the assumption of the horizontal posture is alone sufficient to check the flux, and even to cause its cessation. The laws of dead matter, however, are modified in the living frame, and in other instances this is but a palliative, though it is true it is one of the first class. The afflux of blood to the uterus is

to be checked by agents acting on the causes which have either produced it or keep it up. The vascular and nervous systems are to be constrained in their inordinate movements. For this purpose, we possess, as to this malady especially, three great remedies; aperients, depletion, and cold. We have found a purgative composed of sulphate of magnesia and infusion of roses, with twenty-five minims of tincture of henbane, of very great service in both chronic and acute menorrhagia; it acts both as a revulsive and as depleting the bloodvessels. To be efficacious, it should be given over night so as to insure four to six watery evacuations in the morning. This draught may be used every night, but it should most especially be resorted to the week before the expected menorrhagic period.

Depleting is of the same nature in its action as the purgative plan, but not so universally applicable. A few ounces of blood, drawn from the arm shortly before the eruption of the flux, will almost invariably stop its inordinate flow; but in one instance we witnessed a violent hæmatemesis succeed the diminished uterine discharge, and in most women the remedy creates much nervous perturbation. In those of full and injected habit of body, in those where the uterine congestion is accompanied with much lumbar or inguinal pain, with throbbing and heat in the vagina, and a tender state of the uterus on contact, it is not only indicated but should be insisted on. Where these symptoms occur in a debile and flaccid frame, cupping on the loins, or, what is best of all for every case, a few leeches (one to four) applied to the cervix uteri by means of the leech tube should be resorted to instead of general bleeding.

During the period of active discharge the medication should be cooling, and the diet unexciting, and the loins and hips should be sponged with cold vinegar water. Cold in a more determined form is rarely required during the active flow of blood, except where the menorrhagia amounts to flooding, and then the treatment is in every respect the same as for that formidable accident in an indistensible uterus, viz., the plug, and cold so as to diminish the temperature of the bleeding part. Where the excessive discharge takes place in the nervous temperament, the aperient plan is better than the bleeding. A few leeches may be required, however, but the modification, chiefly necessary in this class of cases, is in the use of such remedies as quell inordinate nervous action, and such a regimen as shall insure repose to the nervous system. A belladonna plaster should be applied to the loins, and opiates may be administered with the greatest benefit, either as enemata or in the usual mode. All emotion, all excitement, should be most carefully avoided, and the body should be kept as free from stimulus as the mind from perturbation.

To these general means we may add two classes of remedies which are supposed to check the flow of blood: these are astringent injections into the uterus, and the use of certain medicines, which act, or are said to act, as styptics. No astringent should be used for the first few days of the period. We should wait until the constitutional effort is established, until the secretion is converted into an hæmorrhage, known by gushings of blood instead of oozings, by a clotted instead of a fluid discharge, and by the absence of constitutional excitement. It is when this has ceased we may resort to alum or sulphate of zinc, or to the vegetable astringents. As to such as stop the blood as styptics, we have found alum in eight or ten grain doses taken in syrup of ginger among the best. We have resorted to the secale cornutum in doses of eight to eighteen grains thrice a day with decided advantage. Its effects differing from styptics are unequivocal, and may be injurious if continued when a sense of tenderness over the pubic region is excited by it.

The various kinds of acids are most efficacious when the menorrhagia is connected with that kind of disorder of the fluids attending scorbutus or purpura. Trousseau, in the paper on the *Menorrhagia of Chlorosus*, recommends pure lemon juice during the day in the milder cases, and ergot of rye in the more severe. The latter remedy will be found most efficacious at night, when, as

he very justly remarks, the gushes of blood are much more copious than during the day. One dose should be taken on going to bed, and a second, if possible, in the early morning. Medicines containing tannin, as catechu, rhattany, are said by most authors to be of much avail.

Such are the means for quelling the excess of discharge in impetu; but what are the modes of preventing its recurrence? Where in simple menorrhagia, the previous discharge has weakened the frame but not removed the congestion of the uterus; where the functions are languidly performed; where there is a feeble rapid pulse, and a fretful fever uncertain in its attack; where there is a slow and laborious digestion; where the external surface is pale and the lips bloodless, the constitution will require corroborants during the intermenstrual periods, while the congested uterus may with advantage be depleted by one or two leeches; and this twofold medication is not contradictory. The loins and hips should be well sponged, and the patient directed to sit for a few seconds night and morning in cold water placed in a shallow vessel. When there is the state of body just described, the best corroborants are steel and quinine. Those persons who exhibit what has been noted as the lymphatic temperament, bear these medicines better than those who are nervous; but even in these this treatment is beneficial, provided it is resorted to in diminished force. To this last class, pure country air, shower bathing, and those adjuvants well known as diminishing nervous action, must be resorted to.

When the disease is chronic, that is, when there is oozing of blood almost always present, in small quantities, with occasional gushing; when exercise even of a gentle and ordinary kind will produce the discharge, it has a great tendency to disorganize the uterine texture. The womb will be found large and heavy in the early stages of the chronic malady; still however it retains its shape, and the relative proportion of its parts. In the latter stages the cervix uteri becomes most congested and bulges, so that the whole organ is more in shape like an hourglass of unequal bulbs, rather than that of a pear. This is a pure effect of gravitation of blood to the most dependent part. If examined by a speculum the cervix is of a deep sanguine hue, smooth but not tense, and shining and dry and painful as in inflammation of this part. In extreme cases the texture is infiltrated with blood, and small clots and scales of cruor adhere to the outer surface of the neck of the womb. Chronic menorrhagia may have these consequences: 1, sterility; 2, prolapsus uteri; 3, it readily leads to a succession of slight inflammations of the womb, known by heat and pain in the part, and by sympathetic nausea or vomiting; 4, it has a tendency to lay the foundation of organic alteration, especially if it occur at the period termed critical.

The treatment for chronic menorrhagia is based on two indications: 1, the state of the organ; 2, the state of the general health. The organ must be unloaded, and at the same time its congested vessels strengthened. All those remedies which prevent the afflux of fluid to the part, or remove its superabundance, and all such as give firmness and vigour to its fibre, must be resorted to: 1, slight local depletion; 2, counter-irritants to abstract the diseased action; 3, the use of such agents as are known to diminish the bulk of parts, viz., tartarized antimony, rubbed in as an unguent, but so as not to create pustules: or iodine; 4, astringent injections cautiously used; 6, sedulous attention during the natural menstruous periods, so as to diminish in every mode the uterine flux, which, however natural, only increases the local malady.

With regard to the general health this soon becomes deeply injured by chronic menorrhagia. There are all the effects of loss of blood added to all those which result from want of exercise and the habits of confirmed invalids. These cases are most difficult to treat, requiring patient attention for a length of time and incessant watchfulness: the majority however recover. When death takes place it is induced either by direct hemorrhage, of which we have seen but few examples; or by diseases awakened in a frame rendered apt for their reception, or by uterine disorganization.

IRRITABLE UTERUS, OR HYSTERALGIA.

Symptoms.—Diagnosis.—Prognosis.—Treatment.

UNDER the term Hysteralgia, Dr. Gooch first described a painful disorder of the uterus, which, in its symptoms, and the sufferings consequent on them, simulated some of the fatal diseases of this organ. As little or nothing has been added to his masterly essay on a malady, which is as difficult for the patient to bear as for the practitioner to cure, the reader is referred to the original paper, of which the following observations may be looked on as a brief abstract. Many of the persons who were the subjects of this malady came, after Dr. Gooch's death, under our care : we can therefore corroborate, in every particular, the accuracy, while we admire the force of his descriptions.

Symptoms. There is pain in the loins and round the brim of the pelvis, which, while it is incessant, yet is subject to aggravations, especialy after mental excitement or bodily exertion. A few days before, or a few days after men-struation, these paroxyms of anguish come on. In one instance, the middle of the intermenstrual period was always the time in which the patient was most urgently affected. The constant uneasiness, with occasional exacerbation, soon induces the patient to give way to the relief afforded by repose, and to stir rarely from the sofa. The result is that the general health is broken by the worrying pain, the want of fresh air and of due exercise ; and a languid cir-culation, constipation, and some of the complications of dyspepsia, are super-induced. In very few cases is the pulse permanently excited. The catamenia at first are unaffected, but subsequently cease as the constitution becomes more debile.

If the uterus be examined, slight pressure will give rise to exquisite pain, which will continue for some time after the removal of the cause. We have found the cervix uteri in most instances puffy and swollen, though without any of the characteristics of scirrhus or other malignant disease, while the vagina is invariably in a healthy state. The persons most liable to the malady are the young or the middle-aged ; rarely, or never, old women. A large proportion of Dr. Gooch's patients had been subject to dysmenorrhœa, and most of those affected were of a nervous and very susceptible temperament. The *exciting causes* are generally some undue exertion at a period when the uterus is sus-ceptible. Violent jolting, long standing when the catamenia are present, will give rise to the malady. In one instance an astringent lotion, used to check profuse lochia, produced this affection.

Diagnosis. Hysteralgia may be confounded with acute or with chronic in-flammation of the uterus, but the absence of enlargement, heat, and throbbing in the organ, the slight alteration of texture contrasted with the intensity of suffering, the stationariness of the symptoms, and the length and course of the malady, are sufficient guides by which hysteralgia may be distinguished from affections which have a tendency to produce disorganization. It might be mis-taken for prolapsus, did we not find that this is completely relieved in all its symptoms by the recumbent posture, when the irritable uterus is only rendered less painful. From the periodical pain of dysmenorrhœa, it differs as to the fact of the suffering being constant. The nature of the malady, therefore, must be inferred to be nervous, from a comparison with painful affections of other parts of the frame, which are characterized by much and long suffering, unac-companied by organic change. Sir Benjamin Brodie has described these under the term of Local Hysteria, and Sir Astley Cooper has given instances of pain-ful mammæ, which might readily have been mistaken for incipient cancers.

The various joints, the spine, the breasts, may be the seat of acute pain more or less constant, enduring for many years and yet never interfering with health of structure.

The *prognosis*, therefore, is always favourable as to life, not quite so as to ultimate recovery, and never so as to a speedy return to health. The majority, however, do recover completely, and all are much relieved.

The *treatment* is based on two indications, 1, to subdue pain, 2, to sustain the general health. When the paroxysms of uterine pain are brought on by even moderate exertion of body, we are compelled to enforce the horizontal posture and absolute repose; but this treatment should not be rigidly adhered to for any length of time, as the nervous irritability, the dyspepsia, and the general health are all unfavourably influenced by it. Even when repose is most strictly enjoined, the patient should be carried into the open air when feasible. The local pain is often mitigated by narcotics, which may be applied to the lumbar surface in the shape of a belladonna plaster, or by friction of the linimentum saponis medicated with opium; or a pill composed of one-third camphor and two-thirds of extract of hyoscyamus, may be taken thrice daily, or injections of acetate of morphia (two to four grains in the ounce of distilled water) may be thrown into the vagina night and morning; or all these various means of influencing the nervous system may, with advantage, be simultaneously resorted to in the more severe forms of hysteralgia. The vapour of steam, or a warm hip bath not of so high a temperature as to stimulate the uterus, will often procure ease. Local bleeding has sometimes been resorted to by Dr. Gooch, and repeated according to the circumstances of the case; but, for the use of this and similar remedies, that sagacious practitioner had the aphorism, That we should cease to employ them if the constitution, rather than the disease, seemed giving way.

All active purgation is invariably injurious in hysteralgia, as never failing to induce a paroxysm of pain. Counter-irritants are of very doubtful use. A generous diet, but so as not to burthen the stomach, fresh air, a gradual and sustained course of steel, and narcotics locally applied, are the best means of attacking this capricious and obstinate disorder. The worst are low diet, the constant supine posture, close confinement and depletions, whether by purgatives or by bleeding. With the former, the malady will be subdued or will subside; with the latter, the health, and even the life of the patient are endangered.

There is a painful state of the vagina which we have frequently met with, which appears to be allied to the affection of the uterus just described. There is neither discharge, nor inflammation, to account for the anguish produced by contact, even of the finger; the inner membrane is not discoloured, nor tense; nor unlubricated, nor in short, in any way deviating from its natural state, save in the fact of a painfulness so excessive, that walking is intolerable, and coitus is not unfrequently followed by a fit of hysterics. All the patients whom we have seen were married, and of extreme nervous susceptibility; in some the painful condition of the vagina came on subsequent to the birth of a first child, and they never conceived again; in others this state was developed by marriage, and was not removed by repeated childbirths.

This malady is to be distinguished from irritable granulations which sometimes succeed ruptures of the perineum, and from chronic inflammation of the vaginal walls. The absence of ruptures in the one case, and of hardness and paleness of the lining membrane of the vagina in the others, are sufficient guides for diagnosis. The treatment is, in the main, that for Hysteralgia.

LEUCORRHŒA.

Acute and chronic forms.—Symptoms.—Causes.—Treatment.

A WHITE discharge, issuing from the vagina, and unconnected with structural disorganization of the genitals, has usually been defined as constituting leucorrhœa. The fluid discharged varies in colour, consistency, and quantity. In colour, from that of a thin solution of gum-arabic to that of pus, which itself may be tinged greenish, or brown, or slightly red; in consistence, from that of limpid water merely, to that of a tenacious, ropy substance, mixed with a thinner liquid; in quantity, from a slight increase of the natural moisture, lubricating the mucous membrane, to several ounces in the twenty-four hours.

Various divisions have been made by way of classification, which throw some light on the nature of the malady. Dewees refers leucorrhœa always to some local disease, generally inflammatory. Pinal has a vicarious, a constitutional, and an accidental variety. Then to these, other authors add a syphilitic, a critical, and a dyspeptic leucorrhœa. The source of the discharge, whether uterine or vaginal, has given rise to another mode of classification.

For practical purposes the division of leucorrhœa, into acute and chronic, appears not to exclude the more elaborate ones, founded on the supposed causes of the malady or its situation, or nature, while it at once points to a variety in the main object, namely, its cure.

We shall not enter on the subject of contagious discharges from the vagina. With regard to the vicarious variety of leucorrhœa it may be stated, we have known a colourless discharge supersede the menstrual flux, and be accompanied by all the symptoms of the periodical secretion; that the suppression of evacuations, to which the constitution has been inured, has been described as being followed by leucorrhœa; on the other hand, a sudden cessation of vaginal discharge has been succeeded by a large flow of pus from the bronchial membrane and by death. (*Locock.*)

Leucorrhœa may occur at any period of life; it is most common, however, during that comprised between the ages of fifteen and forty-five. Young infants and children are subject to acute attacks of vaginal discharge, accompanied by more or less of local inflammation; and here the mucous membrane of the vagina appears to share in the susceptibilities of this class of organs, common to this period of life, in which the intestinal surface is easily deranged, and always is more active than at any other stage of existence; when the lungs secrete copiously; and when the commonest form of acute pulmonary attack is that formidable bronchitis known under the name of bronchial fever, or the epidemic peripneumony of children; when the membrane of the nostril is also the seat of maladies unfrequent or unknown at a later age. The leucorrhœa of infants is very often a mere catarrh of the vagina, but most generally sympathetic of intestinal irritation.

In old age discharges from the vagina are comparatively rare, and should always be viewed as less innocuous than those of early life. In certain constitutions leucorrhœa is more common than in others. The luxurious excitements of the higher orders of society, where the nervous system is so much, and the muscular so little exerted, is very favourable to the developement of this malady. Any thing which debilitates or over-excites the uterine system, will tend to produce it; and there are few disorders of the general health unaccompanied by some irregularity of the vaginal secretion. With regard to the seat of this disorder, pregnant women, in whom the orifice of the uterus is closed, are sub-

ject to leucorrhœa : hence we have direct evidence of its seat being, in these instances, exclusively vaginal. On the other hand, we are equally certain that the inner membrane of the uterus, when irritated by structural disorder of the womb, is capable of secreting matter not to be distinguished from that of common leucorrhœa. There is no reason, therefore, for doubting that other causes of irritation than those dependent on uterine disorganization may likewise rouse the inner membrane of the viscus to unhealthy secretion. In severe forms of leucorrhœa, whether chronic or acute, the cervix uteri is rarely unaffected, being generally softer, larger, and moister, and not unfrequently more sensitive than natural. This portion, too, of the lining membrane extending through the cervix into the orificium internum uteri, is especially formed for active secretion ; the palmæ plicatæ which radiate on it, and which in the progress of utero-gestation become so curiously developed, and in the progress of labour pour forth such a load of mucous secretion, prove by the inferences derivable from the structure itself, as well as the direct fact, that it can be the seat of active secretion, and therefore of deviation in its natural function.

In the majority of cases, however, we are inclined to believe that the seat of discharge is vaginal.

The forms of leucorrhœa are either *acute* or *chronic*. In the acute, the symptoms are those of inflamed mucous membrane ; pain, swelling, heat ; at first a thin exudation, like that in common catarrhal inflammation of the Schneiderian membrane ; then thicker, and, lastly, purulent : with the establishment of pus the pain and swelling abate. The other symptoms depend mostly on the effect produced on the bladder and rectum, both of which are irritated. Difficulty of walking, excoriations, &c., are readily traceable to the situation of the inflamed organ, and to the character of the discharge. In some cases the constitution is affected with febrile excitement.

In the chronic form there is a variation in the symptoms, corresponding with the quantity and quality of the discharge. When the evacuation is large, the signs of debility, of dyspepsia, of a deficient hæmatosis, and of nervous excitability, supervene ; to which there are added pelvic uneasiness, weight, or even obtuse pain. The flow of matter exhibits these peculiarities ; it is generally imperceptible and continuous ; sometimes, however, it is intermittent, that is, discharged in gushes, as in hæmorrhage ; or it comes away mixed with masses of ropy mucus, as thick as that passed in chronic dysentery, or in the last stages of common catarrh of the nostril.

It is probable, that the intermission of discharge is a mere result of retention of fluid in the hollow and dependent parts of the pelvis, until the quantity overflows ; in some instances, however, there is painful contraction, which the patient refers to the internal portions of the vagina, and which, whether uterine or not, we cannot determine. The mucous masses are, probably, secretions from the superior part of the vagina and cervix uteri itself, as it is in these structures that the mucous crypts and follicles are most developed ; the purulent secretion with which it is passed obviously having a different source, since the same part never casts off at the same time both pus and mucus.

Causes. This discharge is, in many instances, but an indication of the general vigour and activity of the organs of generation. It is compatible with excellent health, a full habit of body, and amounts only to a local inconvenience. The persons so constituted are, however, liable to pains in the situation of the ovaria, which endure many days with little fever, but great discomfort, amounting at times to agony. The paroxysms unite the characteristic of two maladies, colic, and circumscribed peritonitis ; and, did the symptoms not remit, and thus for days remain stationary, instead of running the onward course of a pure inflammatory disease, we might be much puzzled. It is best relieved by local instead of general bleeding, by saline and not by aloetic aperients, and by anodynes. The above form of leucorrhœa must be considered as dependent on constitutional causes and on local irritability. There is a reverse state exhibited

in the leucorrhœa of debility. In these the frame is weak, the vaginal folds ample, and much relaxed. A third class of causes depends on sympathetic irritation, arising from functional or structural disorders of the digestive organs. Obstruction to the return of blood, to the right side of the heart, will cause and keep up leucorrhœa. Diseases in the system of the vena portæ, or in the hæmorrhoidal veins, will especially do so. A fourth class of causes must be looked for in such as act purely locally, giving rise to irritations or inflammations of the uterine system. Dewees, who seems to consider all forms of leucorrhœa reducible to this last class, is certainly exclusive in so doing.

The *treatment* must, of course, have reference to the cause which produces the malady, to the state of the constitution, and to that of the organ. In the acute form of leucorrhœa the organ generally requires local depletion : a few leeches, tepid lotions, aperients, and a restricted diet soon allay the congestion of the mucous membrane, and then the treatment merges in that for the chronic form of discharge.

In chronic leucorrhœa the first thing to be assured of is the absence of local disease ; of prolapsus, polypi, ulcerations, excrescences in the vagina or uterus. The next is to ascertain that the flux is not a symptom of oppressed circulation, or of disease in the abdomen, and especially of the rectum. When these causes have been eliminated, and it is made out that the malady is dependent on a local state, combined with disorder of the general health, we have the disease for which such a variety of empirical remedies are said to be successful. Nothing can be more variable than the shadings of disordered health ; for in ninety cases in the hundred, hysteria, in its Protean forms, mingles with leucorrhœa. In some there is inordinate nervous sensibility, in others torpor and inactivity ; in a third, with general debility, there is extreme nervous irritation in the uterine system, unceasing pruritus referrible to the uterus itself, or aching scarcely amounting to, but more intolerable to the patient than pain. In any grade or kind of chronic leucorrhœa, however, the uterus does not fail to draw into its sympathies the digestive organs. Strict attention, therefore, must be given to diet, exercise, and mode of life. A diet which is devoid of all excitement, and is confined to simple nourishment, without stimulating the stomach ; pure air, and absence from those habits of late hours entailed by a life in the metropolis ; are essentials to a speedy cure of the severer forms of chronic leucorrhœa : and with these prophylactics, all that regimen so well known as the dyspeptic should be resorted to. The treatment for disordered general health is not alone sufficient. In leucorrhœa, as in the other functional disorders of the uterus, steel is among the best remedies ; hence the inveterate forms are most speedily cured at chalybeate springs, either at home or abroad. With this general attention to the constitutional treatment, the local affection must be locally attacked, first by extreme cleanliness, and then by anodyne, astringent, or alterative applications, together with such medicines as, when taken internally, are known to act on mucous surfaces. Of the local applications zinc, alum, the vegetable astringents, as catechu, cinchona, oak bark, the rind of the pomegranate, may be used so long as no tenderness, nor sense of weight in the pelvis be produced by them. If this be brought on it is a sign of uterine congestion in a slight degree ; if it be further accompanied by evening or morning sickness, the congestion is of a more serious form. Anodyne injections of laudanum, poppy decoction, &c., are indicated when the leucorrhœa is accompanied by hypersensibility of the vagina and uterus. The class of applications, termed alterative, are such as disturb the secreting surface of any organ, such as mercury, a remedy proposed by John Hunter to be applied to the vagina on a cylindrical pessary ; the Lunar Caustic (*Jewel*) : or the Lapis Infernalis (gr 10 to ℨj water) (*Ricord*) : weak solutions of ammonia ; and, in short, such agents as are known to disturb the secerning process of diseased surfaces. Every thing depends on the mode of application.

In the virgin state the leucorrhœa is rarely so intense as in married women,

though, perhaps, more frequent; and to these local applications are rarely admissible, save as lotions.

In the married patient, a cylindrical pessary, made of sponge dipped in the proposed solution, whether astringent, anodyne, or alterative, may be applied, and retained, or speedily withdrawn according to circumstances.

With regard to the medicines which act on the utero-vaginal membrane through the general system, the best are cubebs, copaiba, cantharides (*Dewees*), the various turpentines, alum, uva ursi.

Besides these there is a long list of specifics, which are partly single medicines, partly compounds, resting on individual experience, unsanctioned by general use.

INFLAMMATION OF THE UTERUS, OR METRITIS.

Congestion of the uterus, and its treatment.—Acute metritis.—Anatomical Characters.—Causes.—Symptoms.—Treatment.—Chronic metritis.—Various forms.—Ulcerative inflammation.—Suppurative inflammation.—Membranous inflammation.—Inflammatory enlargement and induration of the substance and mucous follicles of the uterus.—Symptoms of chronic metritis.—Causes.—Treatment.

Congestion of the Uterus. At the return of each menstrual period the uterus becomes the seat of a temporary congestion. Under the healthy action of the system this degree of congestion can scarcely be regarded as morbid, but it certainly borders upon that state; and on every slight derangement, either in the function or organization of the uterus, it readily passes into a concretion which must be looked upon as a diseased state, which is *per se* of little moment; but it becomes a morbid condition of primary importance when considered in relation to its effects and in reference to the rank which it holds in the production, pathology, and proper therapeutic treatment of the diseases, functional and organic, of the internal female organs of generation.

By its monthly repetition it acquires, in the eye of the practitioner, a power which it would not otherwise possess, and exerts a great influence over the course and treatment of all uterine affections. It is on this principle that we would explain much of the inveteracy of uterine diseases, and the inefficacy of the curative means employed in their treatment.

Diseased uterine actions, originally slight, are liable in their nature to be aggravated by the supervention of this monthly congestion, and more serious forms of disease are often prevented by it from proceeding to a healthy termination. Acute diseases, which were probably nearly subdued, are readily rekindled by its recurrence, and under the repetition of periodic excitement, such diseases are apt to become chronic. Chronic affections, on the other hand, are liable to undergo from the same cause, at each monthly term, a degree of temporary activity, and in each case the advantages that may have been gained by perseverance in the proper remedial measures during the time intermediate between the two menstrual periods, may be more or less lost during the next accession of the catamenial congestion.

It is on these grounds that even the natural state of menstrual congestion becomes an object of interest, and its importance is always increased when the congestion itself is rendered greater or more marked, as it so often is, by the existence of any functional or organic disease of the viscus.

It is unnecessary to dwell upon the pathological characters and terminations of congestion of the uterus. The congested organ is injected, swollen, has often an œdematous feel, and possesses all those other characters pointed out in the section on Inflammation, under the general head of *Morbid Congestion ;* with

this exception, that more frequently perhaps effusion of blood occurs from the congested vessels of the uterus than from those of most other organs under the same condition.

This tendency to hæmorrhage is always greatly increased by the presence of organic disease in the uterine parietes. The effused blood generally escapes from the free mucous surface of the organ, but it is sometimes retained and accumulated in great quantity in the uterine cavity, when the os uteri happens to be so obstructed as to prevent its exit.

In other cases it is accumulated within the cavity in the form of a solid laminated coagulum. It is rarely effused amidst the proper tissue of the uterus, except in the puerperal state, and in the last stages of malignant disease. Sometimes, however, in females dying at an advanced age, the more internal layers of the uterine parietes are found injected, ecchymosed, and softened. In these cases the body of the uterus is generally alone the seat of the effusion and the cervix remains unaffected.

The most frequent exciting causes of morbid uterine congestion certainly consists in the periodical determination of blood to the organ at each return of menstruation. It is at these times principally, and in some cases only, that the congestion accompanying an uterine polypus, or other organic diseases of the viscus, gives rise to actual effusion of blood from the vessels. Any cause tending to produce an unusual determination of blood to the part, may lead to the same effect, such as venereal excitement, strong mental emotions, exercise and fatigue in the erect posture, &c. A powerful predisposition to the disease is sometimes given by the frequent repetition of abortion.

The principal local symptoms, in cases of uterine congestion, are a feeling of fulness and weight in the uterine region ; pains not increased on pressure, and generally of an intermittent character resembling colic and tenesmus ; and, occasionally, discharges of true blood in greater or less quantity. Where the congestion has been of long duration, the uterus itself, when examined per vaginam, will generally be found enlarged, and low in the cavity of the pelvis, the os uteri patulous, and its lips swollen and spongy, but little if at all tender upon pressure ; there is not, however, the increased heat of those parts as we find in cases of inflammation. The use of the speculum shows the discoloured and purplish state of the surface of the cervix and os uteri, and particularly of the lining membrane of the latter ; occasionally an exudation of blood is to be seen upon it.

The constitutional symptoms of uterine congestion vary exceedingly in different cases. Slight febrile symptoms and alternate shivering and flushing are often present, with lassitude, headache and sickness. Sympathetic pains are sometimes excited in distant parts of the body, particularly in the left hypochondriac region ; and the mammæ occasionally enlarge and become irritable. In other cases variously marked, hysterical symptoms occur in connexion with uterine congestion, and become aggravated at every return of it.

In itself morbid congestion is seldom a diseased state demanding direct medical interference. It is, however, as we have already stated, of the greatest importance, as an almost constant complication of the other functional and organic diseases of the uterus. We need not discuss the general treatment of congestion, but shall mention only these peculiarities which congestion of the uterus requires in this respect ; we allude particularly to that form of congestion which is so apt, in the uterine diseases, to accompany and aggravate these affections at the return of the monthly periods.

Rest, in the supine posture, is one of the most important of the measures which we should adopt. It is not, however, to be regarded alone as a direct and effectual means of treatment, but, without it, all our other resources will in general fail. Its importance we can easily understand when we reflect how readily blood gravitates to the more dependent parts of the body, more especially if the general system happens at the time to be debilitated, or if the

vascular system of any dependent organ is in so weak a state as to admit of congestion occurring in its vessels with more than usual facility. We assume, in fact, the supine posture here as one element in the treatment, for the same important reason as the surgeon¹ insists upon it in the treatment of an injured, inflamed, or ulcerated limb; and we look upon it as an indispensable measure, during the period of menstrual congestion, as well as in the course of the active treatment of all uterine affections. It is sufficient, in many cases, to cancel the bad effects of the uterine congestion, but where it is not, the detraction of blood either generally or locally becomes indispensable. The selection of local or general bloodletting must necessarily depend upon individual peculiarities, such as the state of general plethora and the strength of the patient's constitution. We have seen excellent effects from small venesections from the arm (to the extent of six or eight ounces) immediately before or at the commencement of the menstrual period, in cases where it was our object to avert the dangers of the accompanying congestion; and we have known similar good effects result from the application of a few leeches to the cervix uteri at the same period.

In constitutions so reduced or anæmic as not to justify the detraction of blood, dry cupping, or slight counter-irritants to the lumbar and dorsal regions may be employed with a similar indication, with such other means as keep the general circulation as much as possible equalized.

The treatment of hæmorrhage from the uterus, where it occurs as a result of uterine congestion, has been already detailed.

Acute Metritis. Metritis, or acute inflammation of the uterus, is a rare disease in the unimpregnated state : the more chronic varieties are however very frequently met with.

The morbid action may be seated in the serous or mucous coats alone, or simultaneously in these and in the proper structure of the uterus. Its effects upon the mucous and serous coats of this organ are similar to those upon the same membrane in other parts of the body. When it attacks the proper tissue of the uterus, the organ becomes enlarged, œdematous, and diminished in consistence. Sometimes, when the morbid action has been very acute, the inflamed part is soft and friable, with pus infiltrated through its tissue. Occasionally, instead of being diffused, the pus is collected in a cavity or abscess in the substance of the uterine parietes. This, however, is a very rare pathological appearance, and we have not seen more than one well marked preparation of it.

The purulent matter may occupy other tissues. Thus it has often been found in the veins, as well as in the dilated lymphatic vessels of the uterus. These appearances, however, have hitherto been only remarked in the puerperal forms of metritis ; and in the epidemics of that disease which we have seen, the lymphatics were certainly more frequently the seat of the purulent deposit than the veins. Sometimes the pus, when effused on the mucous surface, is collected in the uterine cavity in consequence of coexisting obstruction of the os uteri ; and again the purulent matter occasionally collects in abscesses limited by pseudo-membranes, the external surface of the organ, or in the cellular tissue between it and the rectum. The more frequent lesion on the peritoneal surface of the inflamed organ, however, consists of the effusion of coagulable lymph and false membranes binding the surface to the neighbouring parts, and leading often to sterility by obstructing the necessary change of position of the Fallopian tube and ovaries, or to abortion by preventing the developement of the uterus beyond a limited extent.

Gangrene also occasionally occurs in the uterus as an effect of acute inflammation, but this is principally observed in the puerperal state, and when the uterus becomes the seat of inflamed and disorganizing morbid deposits.

Causes. Suppression, partial or complete, of the menstrual discharge from exposure to cold, or the use of astringent injections, and mental emotions constitute perhaps the most common causes of acute metritis in the unimpregnated state. Abuse of sexual intercourse, physical injuries and succussions of the

lower part of the body, particularly if they have occurred at the catamenial period, are sometimes also observed to give rise to it.

Symptoms and Diagnosis. Sudden stoppage of the catamenia, a feeling of heat with tenderness on pressure in the uterine region, pain, and sometimes swelling of the cervix of the organ on vaginal examination, pains stretching to the loins and thighs, difficult micturition, a sense of weight and bearing down, and occasionally, after a time, abdominal swelling and tympanites constitute the more important local symptoms which severally or conjointly accompany acute metritis in the unimpregnated state. The constitutional symptoms vary greatly in character and intensity. They are regulated by the severity of the attack, but still more by the susceptibility and irritability of the system of the patient. In some cases there is well marked fever. Frequently the disease gives rise to irregular hysterical symptoms, particularly in those who are subject to this affection, and nausea and vomiting are often present.

Occasionally in the more aggravated cases, headache and the more formidable symptoms of cerebral derangement, such as slight delirium, deafness, impaired vision, and even a tendency to coma, with great prostration and subsultus tendinum, supervene. These last symptoms are frequently observed in cases arising from sudden suppression of the catamenia, and we are inclined to think that they ought not so much to be attributed to any constitutional sympathy as to the retention in the circulation of the principles intended to be eliminated by the menstrual evacuation. We see, at least, similar symptoms produced when other excreted fluids (such as the bile or urine) are retained in consequence of inflammation, or other disease of their appropriate organs.

Treatment. This differs little, if at all, in its general principle from that which has been laid down so frequently in different parts of this work with regard to acute inflammation in other internal organs. We may state that, in general, we find venesection and the local detraction of blood well borne in these cases. Local depletion in this case is best effected by cupping the loins, or by applying leeches to the groin or vulva. We have at the same time frequently employed a combination of opium and tartrate of antimony (1 gr. of opium and ¼ gr. of the tartrate in the form of a pill) repeated every hour or two, till either the pain was abated, or sleep was procured. In some aggravated forms of puerperal metritis this practice has been followed by the best effects. In cases of the disease originating in suppression of the menses, antimony, acetate of ammonia, and other diaphoretics are often of much use : local fomentations frequently repeated, the hip-bath, and other measures calculated to restore the uterine discharge being at the same time employed.

Counter-irritation by turpentine, mustard poultices, and croton oil, is preferable to that effected by cantharides, which sometimes aggravates such cases by its effect on the urinary bladder. The dysuria which not unfrequently accompanies acute inflammation of the uterus may be relieved by mucilaginous drinks, but can only be fully removed by the measures calculated to relieve the metritis itself. The bowels must be kept open by some of the milder cathartics only, in order to avoid undue intestinal irritation ; and these, if necessary, may be assisted in their operation by injections of warm water, or any simple form of emollient enema.

Lastly, we would state as being a point of great consideration, that if once the disease is detected, our measures should be employed and pursued vigorously, in order to arrest the disease as early as possible, and to prevent its running on, as it is so very liable to do, into any of the different and distressing chronic forms of metritis that we have now to describe.

Chronic Metritis. Chronic inflammation of the uterus, from the frequency with which it occurs, is probably, in a practical point of view, the most important structural disease of this organ. The idiopathic form is exceedingly common, but it is also often found complicating various other organic diseases of the uterus, adding greatly to the distress created by them, and in many

instances accelerating their progress. It is an affection to which too little atten-
tion has hitherto in general been paid; its effects and consequences, however,
have received more patient investigation than the disease itself.

Chronic metritis may appear under different pathological forms: we shall in
the present instance consider it in relation to the four principal varieties under
which it is met with in practice, namely, as consisting of and terminating in
1, ulcerative, 2, suppurative, 3, membranous inflammation, and, 4, as leading to
inflammatory enlargement and induration of the substance and mucous follicles
of the uterus.

1. *Ulcerative inflammation.* We have seen ulceration of the inner sur-
face of the body of the uterus result from acute metritis in the puerperal state;
but when ulceration takes place as an effect of chronic inflammation of the
organ, it is almost always confined to the region of the cervix. In this locality,
chronic ulceration becomes important, from its occasionally giving rise to very
distressing symptoms, and from its being frequently mistaken for disease of a
more malignant character.

Chronic ulcerations, the result of inflammatory action, are generally situated
on the vaginal surface of the posterior lip of the cervix, more rarely on the
anterior, and we have found it occasionally appearing at, and as it were
encircling, the very orifice of the os uteri.

At present we know little of the history of the first appearance of this disease,
whether it originates in local inflammation and distension of the Nabothian
follicles, or, as in the mucous membrane of the eye, in pustular or other forms
of inflammation of the proper mucous membrane of the part. In some cases the
ulcer is single, small, and circumscribed, with smooth edges; in other instances
we see several ulcers present, or one large one of an irregular shape and of a
diffused form. The ulcerated surface may be found either of a bright red colour
like a healthy granulating sore, or the redness may be less marked, or again, it
may present a straw or yellowish colour.

The ulcer is generally very superficial, and hence it cannot, in some cases,
be detected by touch alone; it may, however, extend, so as to eat more or less
deeply into the substance of the cervix. The neighbouring parts are indurated,
in proportion to the degree of chronic inflammation which accompanies the
ulcerative process.

2. *Suppurative inflammation.* To this form of chronic metritis we refer
almost all those cases of leucorrhœa in which the discharge proceeds from the
mucous membrane of the uterus itself. The source of the discharge in these
cases is in general well shown by its aggravation immediately before or after a
monthly term, and by its assuming at these periods a more purulent appear-
ance, facts which do not hold good with regard to vaginal leucorrhœa. We
refer for the more full discussion of this subject to the article Leucorrhœa, and
shall only further remark here, that chronic suppurative inflammation of the
uterus may be either an idiopathic affection, or may be excited and kept up by
the presence of tumours, polypi, &c., in the walls or cavity of the uterus itself.
When the os uteri happens to be obliterated by inflammation or other causes,
the pus may accumulate within and distend the uterine cavity, a pathological
appearance of which we have several cases on record.

3. *Membranous inflammation.* One form of chronic metritis is well marked
by its tendency to the effusion of coagulable lymph upon the mucous surface of
the uterus. This lymph or fibrin may be thrown off in the form of shreds and
laminated patches, but in general it is accumulated within the uterus to such
an extent as to form, before its expulsion, a complete mould of its cavity.
In some cases these fibrinous moulds are passed only once or twice during life,
but in other instances they almost constantly collect during the interval between
the menstrual periods, and are expelled regularly at every monthly term, or at
more distant periods. When this occurs they give rise to one very painful form
of dysmenorrhœa.

These false membranes often acquire considerable size, and by their accumulation distend the cavity of the uterus. They have often been mistaken for abortions: this error is the more likely to occur, in consequence of uterine contractions and pains, and sometimes a degree of hæmorrhage accompanying their expulsion. They want, however, many of the characters which distinguish the fœtal bag and membranes. They have no embryo in their cavity; and, what is still more important as a means of distinction, they show none of the villi of chorion, nor any of those small but numerous foramina peculiar to the decidua to be traced on their surface.

We have been led by various circumstances to consider the form of chronic metritis as much more frequent than it is generally supposed; and we have often found more or less distinct traces of it in uterine complaints, where the shreds and discharges were not remarked until the patient's attention was particularly directed to the subject.

This form of chronic metritis is analogous in its pathological characters to that sub-inflammatory action which occasionally gives rise to similar chronic fibrinous effusions upon the mucous membrane of the bronchial tubes, intestines, Schneiderian membrane, &c. In one case that was some time ago under our charge, these fibrinous membranes were alternately discharged from the uterus and intestines. We have seen one specimen of a false membrane forming one complete fibrinous coat of the puerperal uterus, resulting from acute inflammation during that period; but such cases are exceedingly rare, and metritis with membranous effusion upon its mucous surface is almost peculiar to the chronic form of the disease alone.

4. *Inflammatory enlargement and induration of the substance and mucous follicles of the Uterus.* The effusions of serum and coagulable lymph resulting from chronic metritis may in this, as in other organs, be thrown out among the component tissues and structures of the viscus, and thus lead to their enlargement and hypertrophy.

Granular inflammation of the cervix, as it is termed, is one form of such disease. In this case, the mucous follicles, scattered over the cervix and at the os uteri, are distended with serous or fibrinous effusion, and project beyond the surface of the part. The disease has been described as a form of chronic metritis, consisting essentially of inflammation and hypertrophy of these follicles themselves; but the whole component tissues of the cervix are generally in an inflammatory state at the same time, and thus enlargement of the mucous follicles can only be properly regarded as one effect and form, and that not constant, of this diseased state.

There is another variety of chronic metritis to which the term granular inflammation has been applied. In this second form the effused lymph, instead of being infiltrated into the follicles or substance of the cervix, is thrown out on its mucous surface in the form of red granulations, like those seen in granular inflammation of the conjunctiva of the eyelids.

Sometimes the whole uterus is enlarged and hypertrophied from chronic inflammation, but more frequently this effect is more limited, and certainly the cervix is, of all parts, that which in the majority of cases is principally or alone affected.

Symptoms. When chronic inflammation or other forms of organic disease and irritation exist in the uterus, we may have symptoms referrible to several different sources present:—1, morbid derangements in the functions and state of the uterus itself; 2, derangements and sympathetic pains in the pelvic and other adjoining parts and viscera; and, 3, we may have a series of morbid phenomena, having reference to the effects of the disease upon the constitution.

In addition to these, there is in the class of diseases in question a further most important set of diagnostic signs to be derived from abdominal, rectal, and vaginal examinations, and by the use of the speculum.

In the different forms of chronic metritis the functions of the uterus itself are

very rarely altered. Very generally, however, the peculiar mucous secretion of the lining membrane and cervix of the organ is increased, and it often alters more or less to a purulent character. At the monthly periods, the catamenial discharge is liable to be either partially suppressed, or in greater quantity than usual, and sometimes it is mixed up with clots of blood. When the membranous form of chronic metritis is present, there may be greater suffering from dysmenorrhœa at the time these membranes are discharged. In chronic metritis and most varieties of uterine organic diseases, the uterus itself seems always prone to a degree of prolapsus. Conception is in most cases impossible under the varieties of chronic metritis affecting the substance and lining membrane of the organ, and hence sterility is a very common consequence of the more inveterate varieties of this affection.

Nothing can be more various than the degree of local suffering produced in different cases by chronic metritis in the uterine region and neighbouring organs. In some instances, the several symptoms referrible to this head are almost entirely wanting, whilst in others, there are in a more or less marked degree a feeling of heat and weight, increased sensibility in the uterine or pelvic regions, sensations of tension and bearing down, dragging pains in the hypogastrium, loins, and thighs, and sometimes sharp or lancinating pain in the locality of the uterus itself.

These symptoms are relieved by the supine posture, and on the other hand are liable to be increased by long standing and fatigue. They are generally aggravated during the menstrual period. We often find also the urinary bladder and rectum much irritated and deranged in their functions, and occasionally we have deceitful sympathetic pains in these organs, as well as at the anus and vulva, or in the course of the lower extremities. In the more aggravated instances of chronic metritis, much constitutional irritation is sometimes produced. There are often present various dyspeptic symptoms, with headache and sympathetic pains in the mammæ, loins, and particularly in the left hypochondriac region. This last symptom (pain under the left mammæ) we have observed to be a very constant phenomenon in almost all varieties of chronic uterine disease. Frequently these constitutional symptoms are complicated with those of hysteria, and occasionally, in the more inveterate cases, an impaired condition of the general constitution approaching to the state of cachexia is superinduced. This last is particularly apt to take place in the cases of the disease that are accompanied with much leucorrhœal discharge, or kept up by the constant recurrence of severe dysmenorrhœal symptoms.

Most of the symptoms which we have now enumerated are common both to chronic metritis and to other varieties of chronic uterine disease. By their presence, in greater or less number, we may probably be enabled to determine, in any individual case, that morbid action does exist in the uterus; but, in most instances, it will be impossible by them alone to ascertain the specific pathological nature of that action. No organ of the body shows less correspondence between the gravity of its morbid lesions, and the severity of the local and constitutional symptoms which these lesions excite. Thus there are sometimes much local and general irritation when only a small and simple ulcer exists on the cervix uteri; whilst, on the other hand, it occasionally happens that the uterus has undergone an extensive and advanced degree of carcinomatous degeneration, without giving rise to any phenomena that would lead us to suspect its existence. Hence arises the great advantage, in uterine pathology, of employing, as measures of differential diagnosis, such means as will make us acquainted with the physical conditions of the organ, namely, 1, manual or tactile examinations, and, 2, visual examination by the speculum.

In chronic metritis it is by vaginal examination alone, and through the medium of the sense of touch, that we can hope to detect the changes that usually take place, to a greater or less extent, in the physical conditions of different parts of the uterus, such as the tumefaction, and probably the induration of one or both

of the lips of the os uteri, the patulous or funnel-shaped condition of that opening, the existence of ulcerative breaches of continuity in its neighbourhood, the increased sensibility and heat of the parts, and the frequent partial prolapsus of the whole uterus. Again, in the same disease, we have in the speculum uteri, not only a most valuable auxiliary measure for confirming several of the more important points ascertained by the sense of touch, but, further, it is through its employment alone that we can recognise the existence of the morbid inflammatory changes of colour at the os uteri and in its neighbourhood. Besides, by its use we may often recognise superficial ulcerations and granular elevations that are too slight to be detected by the most practised touch, and in all cases in which the disease is conjoined with a discharge, we may satisfy ourselves both as to its exact source and its prominent physical characters.

Great difficulties have been placed against the general introduction of the speculum into practice, in consequence of the revolting exposure of the person of the patient which is usually considered necessary for its employment. We have latterly in our own practice endeavoured to avoid this very natural objection, by teaching ourselves to introduce and use the instrument when the patient was placed on her left side in the position usually assumed in making a tactile examination. In this way we have found that the instrument can be employed with little, or indeed without, exposure of the body of the patient. We have made trials of many different forms of specula, and find, for almost all purposes, that of Ricord by far the most useful and manageable.

Causes. The causes of chronic metritis are such as induce the acute forms of the disease, more especially sudden suppression of the menses and other irregularities in the catamenia, injuries received in abortion or parturition, excessive sexual excitement, exposure to cold particularly during menstruation, physical violence, displacement of the uterus, &c.

Treatment. Till of late years no class of complaints were more generally mistreated than those arising from chronic metritis. Within a very recent period, the several consequences and principal symptoms of the disease were each looked upon as independent functional affections, and treated accordingly. In other words, remedies were applied, almost at hazard, to the effects of the metritis ; and the leading phenomena of the disease were subjected to medicinal measures, whilst the metritis itself was neglected or misunderstood.

In no department of practice has the importance of the more accurate pathological views which have been acquired of late years been more forcibly illustrated than in reference to the present affection ; and the great improvement which has at the same time taken place in our means of forming an accurate diagnosis in uterine complaints has also, no doubt, greatly promoted this result. Thus as we have just hinted, the particular forms of leucorrhœa, dysmenorrhœa, &c., which occasionally accompany chronic metritis, were formerly empirically treated, along with all the other varieties of the same nosological affections, upon some general and common rules, and without any regard whatever to the pathological state of the uterus on which they might be dependent. In other instances, again, the local diseased state of the uterus present in metritis, when it was really ascertained, was too often looked upon as of a malignant nature, and palliative measures were alone employed, when more active means might have restored the patient and arrested the progress of the diseased action. It is unnecessary to add how much our increased knowledge of the pathology and diagnosis is calculated both to improve, and at the same time to simplify, our prognosis and our principles of treatment. In fact, with the modern views of uterine pathology, a case of chronic metritis, instead of appearing under a variety of forms with a variety of diversified treatment adapted to each, simply resolves itself into a case requiring the application of those general principles of treatment that guide the practitioner in the management of other local chronic inflammations, with such modifications only as we have already pointed out (under Conges-

tion of the Uterus) as required by its dependent position and peculiar functions.

We consider it unnecessary to state at length the detailed treatment of a local chronic inflammation, such as chronic metritis, inasmuch as the general principles applicable to this state have been already sufficiently laid down and discussed under different heads, and in reference to other internal organs. We shall therefore confine ourselves to a few remarks on this subject.

When the constitution of a patient affected with any of the forms of chronic metritis is in any degree plethoric, or can bear loss of blood without material constitutional harm, small derivative bleedings from the arm to the extent of six or ten ounces, will often prove of great advantage, particularly towards the recurrence of the menstrual period. We have pursued the plan of small general bleedings at the interval of a few days between each, in cases where local abstraction of blood was objected to, and have seen excellent results from it; but certainly we prefer, as a more effectual measure, the repetition of the local bloodletting, when that can be accomplished.

In uterine diseases it was formerly the practice to abstract blood locally when required, by cupping glasses to the lumbar region or sacrum, or by leeches to the groins or vulva. Certainly, one of the greatest improvements that has been introduced of late years into the treatment of these affections, and particularly of chronic metritis, is the adoption of a more efficacious plan of local bloodletting by the direct abstraction of blood from the uterine vessels themselves. This may be very readily effected by one of two plans, 1, by the application of leeches to the vaginal surface of the cervix uteri; or, 2, by making scarifications in that part.

We have employed the latter mode (scarifications of the os uteri) in several cases with such ease and effect, that we would be inclined to prefer it to the employment of leeches, if its adoption could be made less formidable in the idea of the patient. The blood is drawn more rapidly, and at the same time with much greater precision, from the engorged vessels themselves. The scarifications must be very numerous in order to be effectual, but they give surprisingly little pain to the patient, and indeed, in some cases, she can scarcely be said to be aware of their performance. We have generally used a sharp-pointed bistoury in this little operation, after having exposed the os uteri with a double-bladed speculum; and by keeping the vagina extended by the latter, three or four ounces of blood will escape in the course of ten or fifteen minutes. We have endeavoured to promote its flow by using the tubular speculum, and applying an exhausting cupping-glass to the outer extremity of it. Hitherto, however, we have not been able to make this addition of much avail.

In applying leeches to the os uteri, some practitioners are in the habit of employing the speculum for the purpose of introducing them up to the cervix. We have found a tube of ivory or pewter, of ten or twelve lines in caliber, to be equally effectual, and it can be used without the necessity of exposing the patient. The tube is six or seven inches in length, and open at both extremities, and when fully introduced to the upper part of the vagina, the leeches are pressed along with a wooden rod. They generally fix readily and may draw a considerable quantity of blood. The hæmorrhage may be kept up after they are removed from the vagina by the use of the warm bidet or hip bath. The number of leeches to be applied, and the quantity of blood drawn, as well as the frequency of the repetition of the local bloodletting, must be regulated by the circumstances and necessities of each individual case. We may remark, however, that the more actively and frequently the measure is pursued in those cases that are at all appropriate for it, the more marked will the effects of the treatment be. During the active stage of the treatment we have been in the habit of employing from three to six leeches every alternate or every third day, until the symptoms more or less completely yielded; and we have been repeatedly

surprised at the good effects resulting from this practice, in patients whose apparently debilitated and impaired general state of body might *à priori* have seemed entirely to forbid it.   In some of these instances the great relief derived from each repetition of the local bleeding, and expressed by the patients themselves, has encouraged us to proceed in it when otherwise we might have hesitated to do so.   The small general and local bleedings that we have spoken of, should after a time be followed by blisters or other counter-irritants to the neighbourhood of the diseased organ.   We have generally been in the habit of applying them to the region of the sacrum, and it is a point of much importance that this counter-irritation should be either frequently repeated, or kept up in the form of a continuous discharge.   For this purpose, strong stimulant liniments may be applied to the lumbar and sacral regions, croton oil or nitrate of silver may be rubbed in upon these parts, a tartar-emetic eruption brought out, or any form of issue opened.   If cantharides be used, they must be employed in such a way as to avoid irritating the urinary bladder.

Along with these active means other antiphlogistic measures require to be adopted.   The extent and nature of these must be regulated in a great degree by the circumstances of each individual case.   In all, it is a matter of the highest importance to restore and keep up a healthy degree of action in the skin and intestinal mucous surface, and to avail ourselves as much as possible of the advantage to be derived from keeping the patient in a recumbent posture.

There is a period in this as in all other forms of chronic inflammation, when tonic and slightly stimulant measures may be advantageously substituted for those of a strictly antiphlogistic character.   Hence we find authors describing the benefit they had experienced in the treatment of the cases (which are now known to have been chronic metritis) from preparations of mineral and vegetable tonics.   In the latter part of the treatment, the cold hip bath or cold affusion upon the loins will be found to be an excellent local tonic.   It is always of importance that the lower extremities of the patient should be kept warm and equally clothed.

In the ulcerative and granular forms of chronic metritis, the use of astringent, stimulant, or sedative washes of different kinds, or the employment of the solid nitrate of silver or sulphate of copper, as direct local applications to the affected part, are of the greatest advantage.   In one case of large irregular ulceration of the cervix, we saw the repeated application of a solution of the corrosive sublimate in the nitro-muriatic acid eminently successful in changing the condition of the sore, and in causing it to assume a healthier state of action.   For the treatment of those derangements in the functions of the pelvic and other viscera, that are liable to be excited by or to accompany chronic metritis, we refer to the articles in the present work particularly devoted to the consideration of the diseases of these viscera.

FIBROUS TUMOURS OF THE UTERUS.

Anatomical characters.—Nature.—Progress.—Symptoms.—Prognosis.—Treatment.

THE uterus may be the seat of various heterologous deposits and morbid growths.   Of these by far the most frequent in their occurrence are fleshy or fibrous tumours.   This appellation is applied to a species of tumour, and which, as its name implies, is characterized by its highly marked fibrous texture.   On dividing such tumours they are found to consist of a mass of irregularly convoluted and contorted fibres.   These fibres are generally also collected into a

number of separate nodules or lobules, which are connected together by loose cellular tissue; so that in each tumour we can generally trace an aggregate, as it were, of smaller tumours which may be either nearly equal to one another in point of size, or have one or more among the number disproportionally large.

Fibrous tumours are attached to the uterine structure in which they are imbedded by a capsule of cellular tissue, which is sometimes so lax as to allow them to be easily enucleated. They vary much in size. They may not be larger than a pea, and in some rare instances, on the other hand, they have been found to weigh as much as thirty or forty pounds. Generally we find several of them coexisting in different parts of the same uterus, and very unequal in regard to size. Their form is usually more or less globular, but they may be very irregular in shape, and either equal or modulated on their surface. Though fibrous tumours are found in the body, or fundus of the uterus in probably the majority of females advanced beyond the age of forty or fifty, yet they are rare in the region of the cervix. They may occupy different situations in relation to the component parts of the walls of the uterus. Thus they may be developed: 1, immediately under the peritoneal coat; 2, in the substance of the walls; or, 3, they may be situated between the proper tissue of the uterus and the mucous coat.

In the first and last situation, they generally become more or less pedunculated. When imbedded in the substance of the walls, they are usually more chronic in their growth and denser in their tissue, than when placed beneath either the peritoneal or mucous membranes. Indeed, the rapidity of their developement and the degree of their density seem to be always regulated in a great measure by the amount of resistance which is offered to their increase by the neighbouring tissues. Hence it happens, that if they are placed near one of the surfaces of the uterus, they enlarge principally in the direction of that surface or towards the side from which they meet with the least resistance; and they may thus come to carry before them in the direction of their greatest increase a thin layer of the proper uterine substance. Further we find, that in proportion as the resistance of the neighbouring parts is overcome either by the natural position or by the growth of the tumour, that its developement is correspondingly rapid, and its component tissues become less and less compact, so much so that when the tumour is only restrained by the mucous lining of the uterus, it may partially assume a loose cellular, vesicular, or cystic structure (the *vesicular* or *cystic polypi* of some pathologists). In other cases where this diminution in their density does not take place, when the tumours are situated in the circumstances alluded to, it will be found that the resistance to their greater developement has been sufficiently maintained through the restraint exercised by the strong capsular layers of the tumour itself.

Many pathologists look upon fibrous tumours of the uterus to be of a schirrous or carcinomatous nature. We are ready to admit that, like all other tissues either healthy or morbid, they may become the seat of the deposit of carcinoma, when the diathesis of that disease happens to coexist, and that then the tumour of which we speak may present all the characters and changes peculiar to a part attacked with that affection. We admit further, that the low vitality of fibrous tumours may predispose them to be the first, or one of the first, seats in which the carcinomatous deposition, when it does occur, may localize itself. But it is certainly no part of the pathological history of fibrous tumours that they are primarily of a schirrous nature, and have a natural tendency to undergo the alterations characteristic of a schirrous part. On the other hand, the series of changes which usually occur in them is of a very differet kind. Like all morbid fibrous tissues, their principal tendency is to degenerate first into cartilaginous matter, and subsequently to become the seat of an osseous or calcareous transformation. This calcareous degeneration sometimes commences towards the circumference, and in other instances towards the centre of the tumour, and occasionally

it goes on to a degree of stony induration. In fact, the bodies described by the older pathologists under the name of womb-stones are merely degenerated fibrous tumours that have produced ulceration through the intervening mucous and other tissues, and thus reached the proper cavity of the uterus, from which they are occasionally afterwards expelled by the uterine contractions. We have had repeated opportunities of remarking this calcareous degeneration equally in the very smallest fibrous tumour, and in those of a larger size.

We believe that fibrous uterine tumours may, in some rare cases, undergo another or cellular form of transformation, and in this way become diminished both in density and volume. It is only by this kind of cellular atrophy that we can explain to ourselves the circumstance of the disappearance to a greater or less degree of uterine tumours that appeared to have all the characters of the fibrous tumour. We have lately had an opportunity of watching one such case, and there are a few others on record. The appearances after death, observed in some instances of this kind, would prove a great addition to our present knowledge.

Fibrous tumours are not very vascular, but we have seen two or three specimens in which their bloodvessels were beautifully and minutely injected. They are very liable to attacks of inflammation, and are more particularly prone to this morbid action when pregnancy supervenes. Under the last condition they entail great danger upon the patient; for very frequently, owing to the increased supply of blood which is afforded to them by the enlarged vessels of the pregnant uterus towards the latter months, or in consequence of the injuries they sustain at the period of parturition, they take on a destructive degree of inflammatory action, which speedily ends in effusions of serum and unhealthy purulent matter into the tissues of the tumour. Softening and disorganization of some parts of their internal structure are thus rapidly produced. We here speak principally of loose fibrous tumours connected with the pregnant uterus, for we have known more than one instance, where these tumours, when dense and of small size, showed no tendency to assume inflammatory action.

We may only add further, with regard to the pathological history of fibrous tumours, that they not unfrequently excite at different periods of their course, considerable irritation and inflammation in the surrounding tissues of the uterus.

Symptoms. Occasionally we meet with large fibrous tumours in the uterus of the dead body, that have not given rise to any appreciable symptoms during life. When imbedded in the proper structure of the uterus, or situated below its peritoneal coat, they rarely produce any phenomena, except those attributable to their mechanical pressure and irritation upon the adjacent organs. In this way we may find them disturbing, to a greater or less extent, the function of the bladder or rectum, producing various complaints, by their pressure upon the pelvic vessels and nerves, or leading to that feeling of bearing down, which all enlargements and irritations in the uterus are so apt to occasion.

In these instances, the functions of menstruation may be either irregular or scarcely interfered with; but when the tumour is situated towards the mucous surface of the organ, we generally find the catamenia increased in quantity, and accompanied with coagula and discharges of blood. The great practical distinction between the effects of fibrous tumours, as imbedded in the substance of the organ or beneath the peritoneum, and as located behind the mucous membrane, consists in the marked tendency of the disease in the latter situation to produce considerable and even fatal attacks of hæmorrhage. A leucorrhœal discharge is also frequently present, when the tumour is thus so placed, as to keep up a degree of chronic irritation and inflammation in the mucous lining of the uterus.

Examination through the abdominal parietes, or by the vagina or rectum, may enable us to recognise the presence of the tumours, when they have attained a considerable size, and to determine their position, magnitude, &c. When the uterus is the seat of an aggregation of such tumours, it presents a

dense resistance, and a nodulated and irregular form, that are quite peculiar to the disease.

Prognosis. In simple fibrous tumours, the prognosis may in general be very favourable. They rarely grow to such a size as to prove very hurtful to the patient from their mere magnitude, and, as we have seen, they are not intrinsically liable to take on any destructive morbid action. When imbedded in the uterine walls, or below the peritoneum, they may remain perfectly dormant, for a long series of years; but they are always liable, as we have already stated, to occasional attacks of inflammation, when sufficient exciting causes are applied. When they project into the uterine cavity, they require removal, in consequence of the discharge and hæmorrhage which they excite.

One of the greatest steps made in modern times, in the pathology of the uterus, is the perfect distinction of these fibrous tumours from cancer of the organ, and the consequent difference which we are now enabled to form in individual cases, with regard to their prognosis.

Treatment. From the pathological remarks that we have made, it will be readily inferred that the treatment of fibrous tumours is in general more of a negative and palliative, than of a positive character. It has been supposed that iodine, mercury, and other deobstruent medicines have had the effect both of arresting and reducing fibrous tumours. It would require, however, more evidence than we as yet possess, before we could with certainty assign such powerful effects, to the remedies in question. In general, all that requires to be done is simply to use means to avoid as much as possible morbid determinations of blood to the vessels of the uterus, to subdue inflammation when it does supervene by the means already pointed out under metritis, and to restrain excessive hæmorrhage by the measures described in the article MENORRHAGIA. In the submucous variety of fibrous tumours, it sometimes occurs, that no means less than the use of the vaginal plug or tampon will be sufficient to arrest the dangerous hæmorrhage that occasionally accompanies this variety of the disease.

Fibrous tumours have occasionally been separated from their connexions by ulceration of the intervening uterine tissues, and have in this way come to be discharged from the female passages. In other instances in which they were pediculated, the pedicle has become more and more slender, till at last the tumour was actually separated. We have known such a separation take place even in subperitoneal fibrous tumours; but we speak of it here, as it is more frequently seen, in the submucous variety. Both these operations of nature have been imitated successfully by the surgeon; and the latter in particular is constantly had recourse to when the disease assumes that form which we have next to consider, namely, POLYPUS OF THE UTERUS.

POLYPUS OF THE UTERUS.

General description.—Forms.—Symptoms, local and constitutional.—Diagnosis.—Prognosis.
—Treatment.

THE term polypus of the uterus is employed to designate a class of tumours that grow from the inner surface of this organ, or of its os and cervix, and are attached to these parts by means of a neck or pedicle, less in diameter than the body of the tumour itself.

Uterine polypi vary greatly in regard to shape, size, and other physical characters. Generally, they are of a pyriform figure, but we find them nearly or even round in some instances, and of a tapering elongated shape in others. They vary in size, from the volume of a pea to above that of a child's head.

Their surface is generally smooth, but it may present considerable difference of colour, being sometimes pale and straw-coloured, and in other cases more or less bluish or purple, and vascular. These polypi may grow from the fundus of the uterus, from its body, from the inner surface of the cervix, or from one of the lips of the os uteri. They are generally attached by their single original pedicle, but we have seen a preparation of polypus that was provided with two, and of another attached by three points or pedicles to the inner surface of the uterus, probably in consequence of adhesive inflammation having taken place between their surface and that of the contiguous mucous membrane, in the locality of these second attachments. Their investing membrane is not unfrequently the seat of inflammation, and it is sometimes under the aggravation of symptoms arising from this cause, that the patient applies for medical aid. We lately were consulted in a case of an enormous polypus which distended the whole cavity of the vagina. On making an examination, the finger brought away a quantity of recent coagulable lymph that had been effused upon the surface of the polypus; and we once witnessed the dissection of a case in which the surface of the tumour was universally adherent, through the medium of a recent false membrane, to the internal surface of the dilated uterus.

A polypus of the fundus or body of the uterus is in its first commencement, and when still small, entirely enclosed within the cavity of the organ; but, in general, it gradually dilates the cervix and os uteri and passes through it, either slowly or insensibly, or it stimulates the containing organ to contract forcibly upon it, and protrudes it, more or less completely, into the vagina. But exceptions to this may be met with; for occasionally we find (as in the case above adverted to) a polypus of a large size still altogether included within the uterine cavity.

Uterine polypi differ considerably from one another in their pathological structure. The principal varieties that we meet with in practice may be reduced to the following forms:

1. Polypi composed of a structure the same as that of the fibrous tumour of the uterus, which we have already described. In fact this kind of polypus, which is the most common type of large uterine polypi, consists merely of a fibrous tumour that had been originally placed immediately beneath or near the mucous surface of the organ, but by afterwards enlarging in the direction of the uterine cavity, it ultimately forms a pediculated or true uterine polypus. This fibrous polypus may, like the fibrous tumour of the uterine walls, present a cartilaginous or osseous transformation of its tissue.

2. Polypi of a cellular tissue, resembling in structure and origin the common benign polypus of the Schneiderian membrane; and, like it, consisting of a morbid hypertrophy of the submucous and mucous membranes of the affected part.

3. A vesicular or cystic variety of uterine polypus is sometimes met with. The cystic structure may be seen through the semi-transparent coats of the tumour in some cases, while in others, it is not apparent until section is made; and it may be confined to the centre or some other individual part of the growth. We have seen this kind of polypus existing in the same uterus with other small polypi of a strictly fibrous tissue, and we believe the former to be merely a type of structure assumed by the fibrous, and probably, also, by the cellular polypus, when their growth or increase towards the uterine cavity is less restrained than usual from the relaxed state of their investing mucous membrane, or in consequence of the morbid dilatation or dilatability of the uterine cavity itself.

4. A small variety of polypus is frequently met with growing from the mucous surface of the cervix, and resembling in its structure in most points the second species. This common species of uterine polypus appears to begin originally in a morbid dilatation of one or more Nabothian glands. These glands are very often seen greatly distended, and give an appearance of numerous small serous cysts existing below the mucous membrane of the cervix.

5. Another variety of polypus, with a broad base and composed of erectile tissue, has been found in a few rare cases attached to the fundus of the uterus. The trunks of the vessels supplying these several varieties that we have described, are in general not very large; though ramifications upon the surface of it are usually morbidly dilated. Occasionally, however, the vascular trunks passing through the pedicle are large enough to cause considerable and even dangerous hæmorrhage by their division. In a case in which we removed a very small fibrous polypus by excision, hæmorrhage took place within a few hours after the operation, to such a degree as to cause repeated syncope.

Symptoms. The local symptoms accompanying polypus of the uterus consist of those to which a foreign body may readily be conceived as giving rise, when occupying the cavity of the uterus or vagina. Thus the mucous secretion of the female passages is increased, and usually becomes more or less purulent in consequence of the irritation and inflammatory state of the mucous membrane, which is kept up by the presence of the polypus. In other words, there is almost always a state of leucorrhœa present, commencing from an early stage of the disease, which varies much in quantity in different cases. The discharge itself is in general comparatively inodorous, but it occasionally has a fœtid character, in consequence of being retained for some time in the passages by the polypus offering a mechanical obstruction to its free escape. The mucous or muco-purulent discharge is in most instances followed, sooner or later, by an occasional intermixture of blood from the surface of the polypus.

This hæmorrhagic discharge is apt to occur under the action of any causes producing a temporary determination of blood to the parts, and if the patient still menstruates, it is generally first observed at the menstrual periods. When the hæmorrhage is at any time profuse, the blood may escape in a fluid state, but it is generally voided in the form of coagula : these coagula occasionally show a laminated appearance, as if they had been moulded upon the surface of the polypus.

These several symptoms of polypus are often mistaken for those of simple leucorrhœa or simple menorrhagia, and the fears of the patient and practitioner are not excited, in consequence of the discharges being unaccompanied by pain. In addition to these uterine symptoms, there may be present the usual phenomena produced by the irritation and mechanical obstruction of a foreign body, situated within the cavity of the pelvis. There is often, particularly after the polypus has acquired any considerable size, a feeling of weight, with dragging sensations in the loins and back. Bearing down pains sometimes occur, more especially when the tumour is making its way from the uterus into the vagina. Tenesmus and dysuria may result at a later stage from the obstruction and irritation produced by the tumour upon the urinary and intestinal passages. Severe constitutional symptoms are often induced by polypus in the uterus. If the leucorrhœal or hæmorrhagic discharges are profuse, the stomach generally suffers much. Severe dyspepsia supervenes with vomiting, palpitation, excitement of the pulse, œdema of the limbs, and other symptoms of constitutional debility and cachexia, and if the disease be neglected the patient may sink under the continued discharges. The quantity of hæmorrhagic discharge and constitutional debility, accompanying polypus of the uterus, is not, by any means, always proportioned to the size of the tumour : thus a small polypus at the cervix sometimes gives rise to effects as severe and fatal as those produced by one of the largest volume.

Diagnosis. The preceding local and constitutional symptoms are so common in most chronic organic diseases of the uterus, that our diagnosis of polypus can never approach to certainty, unless we make a vaginal examination. In every case of obstinate leucorrhœa or menorrhagia, it is the imperative duty of the practitioner to do so, in order that he may ascertain the pathological state of the uterus, which he has in reality to treat.

On making an examination per vaginam in a case of polypus, a tumour in

some respects moveable, and with its stalk passing either entirely through the os uteri, or attached to one of its lips, is generally at once detected. The tumour may, however, on our first examination, be still entirely included within the cavity of the uterus, and hence may not be reached by the finger. The tumour itself is, in the great majority of instances, perfectly insensible, so that it may be pinched or punctured without producing pain; but rare exceptional instances to this general rule occasionally occur in the case of fibrous polypi, that had descended into the cavity of the vagina invested by a considerable layer of the proper tissue of the uterus.

Prognosis. When once polypus of the uterus is detected, the prognosis may in general be highly favourable. The difficulty of the case consists as much in making the diagnosis as in following out the treatment. The diseased struc-tures of which common uterine polypi are composed have no tendency to repro-duction after they are once removed. The operation for their removal is in the great majority of cases attended with little danger; and the rapid improvement which the patient experiences after its performance renders it one of the most satisfactory which the practitioner is called upon to perform. The polypus is certainly not in itself a tumour inevitably fatal, nor in any degree malignant in its character, but it is liable (as we have already observed), if it goes on pro-gressing, to produce death by the excessive discharges and constitutional effects which we have described. In some instances the tissues of the tumour have become inflamed and broken up, and the inflammatory action has stretched to the uterus and peritoneum and thus proved fatal. In a few rare instances, the tumour has been successfully separated at its pedicle by the efforts of nature; and it is this operation which we endeavour to imitate with such advantage in its treatment.

Treatment. The usual treatment of menorrhagia and leucorrhœa may be temporarily useful in cases of polypus; but it is an established rule in practice, that as soon as the tumour is sufficiently within reach, it should be removed by operative interference. The tumour may be separated by one of three methods: 1. If it is very small, or of a cellular character, it may be reversed by tortion; 2. The tumour may be drawn downward and the pedicle divided by the knife or scissors; and 3. A ligature may be applied to the pedicle of the polypus, and thus a process of disjunctive ulceration may be set up in the constricted part to such an extent, as completely to divide the stalk in the course of a few days.

We must refer to works on midwifery, and surgery for the details of these different operations, and the particular cases to which they are each respectively applicable.

CAULIFLOWER EXCRESCENCE OF THE UTERUS.

Pathological nature —Symptoms.—Treatment.

A MORBID fungus-like excrescence sometimes grows from one lip, or from the whole circumference of the os uteri, insensible like the ordinary polypus, but differing from it in having a broad base and rather irregular surface, and with a greater disposition to bleed, and a much more marked tendency to become re-produced, after it has once been removed.

This species of growth has received the name of cauliflower excrescence, in consequence of its generally granulated surface; both in colour and other physical characters it might be more properly compared to the strawberry. The granular surface is not by any means always distinct during life, and the fungus mass often imparts the feeling to the finger of a solid and irregular

coagulum of blood, or, as it has been described by some authors, it communicates to the touch a sensation like that of the uterine surface of the placenta.

Pathological nature. Considerable difference of opinion has been expressed by pathologists with respect to the morbid anatomy of cauliflower excrescence. Several facts would almost seem to show that, in its first stage, the disease partakes much of the nature of an erectile tumour, or of simple vascular sarcoma. Thus its occurrence in some cases as early as the twentieth year of life, its occasional shrinking and almost total disappearance upon the application of a ligature, or after the death of the patient, its alleged total removal in one or two instances under the use of astringent applications and other simple means, the slowness of its general progress during life, and the healthy condition of the neighbouring tissues and parts after death, are all circumstances which lead to the opinion that, in the earlier part of its progress, the tumour is at least not of a carcinomatous nature. At the same time, however, we have seen sufficient evidence to convince us, that the cauliflower excrescence may become the seat of carcinomatous or encephaloid deposit during its progress, whatever may be its nature at its first commencement. We have a preparation in our museum of a cauliflower excrescence which we removed a short time ago by excision of the cervix uteri. The growth has the small granulated character very well marked upon its surface: on rubbing a portion of the recent tumour between the finger and thumb, it readily broke down, and left a kind of vascular or cellular framework; but, after immersing for some time the mass of the tumour in an alcoholic solution of corrosive sublimate, it presented to the touch and sight an appearance exactly resembling that of cerebral matter hardened by the same means, with the exception only of showing a number of small cells on the surface of the section.

Symptoms. Cauliflower excrescence is accompanied with little or no pain. From the delicate vascular membrane which invests its surface an abundant secretion or exudation of serous fluid is generally poured forth; and this discharge constitutes, along with the great tendency to hæmorrhage, one of the most marked effects or symptoms of the disease. Hæmorrhagic discharges are liable to occur from its vessels, under any causes producing local excitement or determination of blood to the uterus. These occasional hæmorrhages and the drainage occasioned by the profuse watery secretion from the surface of the tumour, sooner or later produce general symptoms of anæmia and constitutional exhaustion. The watery exudation is inodorous in most cases: occasionally it is mixed up and accompanied with leucorrhœal discharges.

On making a vaginal examination during life, the physical characters of the tumour which we have above described are easily recognised, and its insertion into the os uteri by a broad base ascertained. When examined by the speculum, the surface of the tumour is seen to be very red or of a bright flesh colour. The tumour itself may not be larger than a hazel-nut, but in a few extreme cases, it has been of sufficient size to fill and distend the whole cavity of the vagina, and even to protrude partially at the vulva. In many instances the disease does not attract the particular attention of the practitioner until the tumour has reached the volume of a large strawberry.

Treatment. As palliative measures in this disease, our two great indications are, 1, to enforce all those measures general or medical, which are calculated to prevent and subdue determinations of blood to the vessels of the uterus, such as mild and unstimulating diet, the recumbent posture, avoiding mental and sexual excitement, with the application in some cases of cupping-glasses and derivatives to the lumbar or sacral regions: and, 2, to use means to arrest the abundant and exhausting watery discharge from the surface of the tumour and the hæmorrhages which are occasionally taking place from it, by the use of the cold hip-bath or douche to the loins, and by the employment of astringent injections. These means appear to be often further useful in this complaint, by producing such a degree of contractile resistance in the walls of the vagina, as compresses

the tumour, and so restrains the rapidity of its increase.   It is always important
to keep the bowels open, as the pelvic congestion arising from constipation is
apt to increase both the watery discharge and hæmorrhage.

It has been proposed to destroy cauliflower excrescences by the use of caustic,
and they have often been partially removed by the application of a ligature to
their base.   The good results following this treatment can scarcely be expected
to be more than temporary ; and occasionally the ligature has done much harm
by the irritation which it has caused, and the impetus which has thus been given
to the regeneration of the disease.   For our own part, we believe that if we adopt
at all any form of operation for cauliflower excrescences, the amputation of the
cervix uteri, and the consequent excision of the very basis of the tumour, is the
only measure which promises ultimate success.   The disease has recurred in
some instances even after this operation, but in other cases on record, the patient
was known to remain free from its return for several years afterwards.   In the
case to which we have above referred, and in which we excised the cervix uteri,
together with a cauliflower excrescence of the size of a small orange attached
to its posterior lip, the patient had not one bad symptom, local or constitutional,
after the operation, and is now beginning to lose her anæmic appearance and
regain her former looks and strength.   The form of diseased structure of the
tumour in this case is certainly such, as renders its future reproduction very
probable ; but at the same time there is no doubt that the operation has, in the
mean time, entirely freed the patient from those discharges, which were making
very rapid inroads upon her constitution, and that it will at least prolong her
life, if it do not entirely preserve her from any future return of the disease.

CARCINOMA OF THE UTERUS.

Description.—Symptoms, local and constitutional.—Treatment.

No organ in the female body is more liable to carcinoma than the uterus. This
disease attacks the uterus under all its different modifications, from simple
scirrhus to extensive cancerous ulcerations and encephaloid deposits in the walls
of the organ and in the contiguous structures of the pelvic viscera.   The car-
cinoma generally affects the structures of the cervix in the first instance, and
thence spreads upwards into the walls of the uterus and downwards into the
upper part of the vagina.   We have, on the other hand, seen specimens of it
in which the disease followed a different course, attacking the fundus first, and
thence spreading downwards in the direction of the cervix.   When it commences,
as it certainly does in most cases, in the tissues of the cervix, it may appear
under the form of a limited deposit or tumour.   Most frequently, however, it
infiltrates and indurates the whole substance of the cervix, and spreads early,
in a greater or less degree, both upwards along the walls of the uterus, and
downwards into those of the upper part of the vagina, without there being any
very marked limit, at which it would be possible to point out an exact line of
demarcation between the healthy and diseased structures.   The carcinomatous
degeneration after a time affects the more contiguous tissues of the pelvis.   The
intervening cellular tissues, and latterly the walls of the bladder and rectum,
become thickened and changed into the diseased structure.   The process of
disorganization and ulceration commences at different periods in different cases.
Sometimes the deposit has taken place to a great extent in both the cervix and
neighbouring parts before ulceration supervenes.   In other cases, this process
begins at a time when the tissues of the cervix itself are only partially indu-
rated and affected.   If the patient survive, the ulceration extends latterly into
the rectum, and still more frequently into the cavity of the bladder ; or the

cavity of the peritoneum may be perforated by the ulceration and sloughing of the affected tissues. At the same time that the process of ulceration is proceeding in one part, the deposit of encephaloid matter may be going on in another; and ultimately, at the period of the patient's death, the contiguous structures of the uterus and upper part of the vagina, the posterior wall of the bladder and urethra, and the anterior wall of the rectum, with their connecting cellular tissues, are ultimately amalgamated, and form one nearly homogeneous mass of carcinomatous degeneration and frightful ulceration. The neighbouring lymphatic glands are often diseased, though not to a very great extent; and frequently the branches of the veins of the uterus and of the adjoining affected parts are filled with the carcinomatous deposit.

Symptoms. The effects produced upon the functions of the uterus itself and the surrounding pelvic organs, by carcinoma in its first stages, differ in few or no respects from those attending other organic uterine diseases. The sensation of pain in the affected part is in general more acute, hot, and lancinating, than in the other forms of disease to which we allude, but it varies exceedingly in different cases in its character and intensity, and even in its locality. In some instances, it as well as the other usual symptoms of pelvic irritation and uneasiness are so very slight, as not to excite the attention or fears of the patient, until the ulcerative stage of the disease is considerably advanced. This certainly is not a very common exception to the general rule, but it is useful in showing us the fallacy of placing implicit confidence upon any particular symptom or set of external symptoms in this and other organic diseases of the uterus.

The menstruation is generally irregular and profuse, but in the first stage of the disease, it may remain unaffected; and at that period conception may even take place, and the woman proceed to the full term of pregnancy. We have seen two cases of this kind, both of whom sunk under all the more aggravated symptoms of carcinoma in the course of a few months after delivery. In one of these cases, the structure of the cervix was so indurated and enlarged at the time of parturition, as to have conveyed to the attendant the impression that the head of a second child was presenting.

On examining per vaginam in the first stage of carcinoma, the cervix uteri (if it form the seat of a deposit) is found tumefied and indurated. The induration is sometimes diffused; more generally, perhaps, it is circumscribed or notched and irregular. The os uteri is more patulous than usual, and the pressure of the finger upon the rigid lips produces pain and some sanguineous exudation. The uterus is usually partially prolapsed and less moveable in the pelvis. The speculum shows the surface of the cervix tense and shining, and of a reddish, purple, or brownish hue. It is certainly difficult, however, either by sight or touch to distinguish between the state of the cervix peculiar to chronic metritis, and that present in the first stage of carcinoma. When the parts begin to ulcerate, the disease is more easily distinguished by a vaginal examination. The irregular fungous ulcer is visible by means of the speculum, and its surface is generally tender on pressure. The other external symptoms also become more unequivocal. The leucorrhoeal discharge which has generally been present from an early date, now assumes more and more of a foetid and sanious character, in consequence of being mixed with the discharges from the ulcerating and disorganising surface of the ulcer. It has a peculiar and highly offensive odour, is more or less discoloured, and often by its acridity causes pruritus and irritation of the passages and vulva. The discharge very soon becomes mixed with blood; and occasionally a profuse hæmorrhage is almost the first symptom which alarms the patient. In advanced life this hæmorrhage is often mistaken for a reappearance of the catamenia.

As the disease advances in its destructive progress, the constitution deeply sympathises, and all the symptoms of cancerous hectic that supervene, are fearfully increased and aggravated by the excessive discharges and other distressing local symptoms; the sympathetic morbid states excited in distant organs

occasionally bring on symptoms very nearly resembling those of heart disease, and of dyspepsia and nephritis. There is often dysuria with tenesmus ; while the functions of the bladder and rectum are otherwise greatly disturbed. If perforation of their coats takes place, the urine and fæces may be latterly discharged by the common cloaca of the vagina, and at last the patient perishes in misery and anguish beneath her accumulated load of local and constitutional sufferings.

Treatment. In cancer of the uterus, as in cancer of other organs, medicine offers no hope of effecting a cure ; and in the few observations which it is necessary to make in this place upon the treatment of the disease, we shall merely very briefly allude to the general means which appear to have the most influence either in retarding the progress, or in alleviating the symptoms of this hopeless and frightful malady.

In the early stage of the disease, the great indication is to prevent or subdue any thing approaching to vascular activity in the affected part. The more completely we can attain this end, the longer, in all probability, we shall be able to keep the disease in a latent state, and we certainly can often date the occurrence of the ulcerative or second stage to the action of some aggravating causes of local excitement.

To fulfil this indication, it will be necessary to feed the patient upon a mild and unstimulating diet, to promote the action of the skin and intestines, to avoid all causes of general or local vascular excitement, whether corporeal or mental, to avert the effects, as far as possible, of the catamenial congestion by the means pointed out under that head, and to subdue any other congestive or inflammatory determination of the blood to the uterus, by the application of cupping-glasses to the loins or sacrum, or by leeches to the vulva or region of the anus. When there is any tendency to hæmorrhoids, (as sometimes occurs, when local uterine congestions take place in connexion with this or other organic diseases of the uterus) the application of a few leeches so as to drain blood from the hæmorrhoidal vessels, is a practice often attended with direct and excellent benefit. After these remarks it is unnecessary for us to state our opinion of the injurious effect of those stimulant and astringent injections which are too often prescribed in the first stage of this disease, in order to control the leucorrhœal discharge and the symptoms of menorrhagia that sometimes attend upon it.

In the second stage of the disease, in addition to attending as much as possible to the general health, and to the relief of the different complications that may arise, medicine can do little or nothing except subdue the attendant bodily and mental suffering by powerful sedatives. These sometimes are called for even in the first stage, when the pain is more than usually severe. The sedatives must be varied from time to time, in order to keep up their action on the system. Opiates may be used in the form of sedative washes, or they may be employed as internal medicines, and alternated or combined with hyoscyamus, belladona, conium, and the like. The preparation of this last medicine (hemlock) often seems to act with almost specific sedative power over painful affections of the uterus. The fœtor of the discharge may in some degree be corrected and modified by the assiduous use of weak injections of chloride of lime ; and the passage of the external organs may be defended against its acrid effects by frequent ablution, and the inunction of their surfaces with oleaginous substances.

A surgical cure of cancer of the uterus has been attempted in a number of cases, by removing the whole organ. The almost immediately fatal results of this operation in by far the greatest proportion of instances, and the unsatisfactory termination of it in the remaining cases in which it has been performed, are such as will, in all probability, prevent others from recklessly repeating it.

The less formidable operation of excision of the cervix uteri has evidently been had recourse to on the continent of Europe in so many cases in which true carcinomatous disease was not present, and the effects of it in true cancer

have hitherto been so imperfectly followed out and detailed, that we have not as yet any sufficient data upon which to form a true estimate of its value from experience alone. From what we have observed, however, in regard to the pathology of cancer of the neck of the uterus, and from its generally involving at an early date the more immediately contiguous structure, we are inclined to believe that, if found at all useful, it will be only in a very limited number of cases.

CORRODING ULCER OF THE UTERUS.

Characters of this ulcer.—Diagnosis.—Treatment.

A PECULIAR and dangerous variety of disease, known among English authors under the name of malignant or corroding ulcer, sometimes attacks the uterus. It commences in the cervix of the organ, and when the attention of the practitioner is first attracted to it, by the occurrence of hæmorrhages or other symptoms, the ulceration may not have extended beyond the mucous membrane, but it gradually spreads in an irregular manner over the whole surface of the cervix, and in its further course involves the walls of the uterus and vagina, and may ultimately perforate the parietes of the rectum behind, or of the bladder in front. Sometimes it has been known to reach the cavity of the peritoneum and give rise to fatal peritonitis.

Of late years pathologists have described corroding ulcers as a result of inflammation in the affected parts. We believe that this explanation may be so far true, but at the same time we cannot but regard the inflammatory action as at least specific in its nature. Its whole pathological history and characters appear to us to assimilate it with that destructive chronic inflammation and ulceration which constitutes lupus in external parts. If the phenomena of the first commencement of the corroding ulcer were more accurately ascertained, this analogy would probably be found to be more correct than the present state of our knowledge will warrant us to assume.

Corroding ulcer of the uterus has often been mistaken for the true cancerous ulcer. The two diseases are doubtless very similar in their symptoms, course, and terminations, but the corroding ulcer specifically differs, in two important respects at least, in its pathological history from carcinomatous ulceration: 1. The corroding ulcer is not preceded by carcinomatous or other morbid deposit in the affected part, similar to that which takes place previously to the commencement of ulceration of a truly cancerous nature. In several preparations of sections of uteri affected with corroding ulcers which we have had an opportunity of examining, we have observed with surprise the uterine and other involved structures apparently perfectly healthy up to the very line of the existing ulceration; and in corroding ulcers, the whole uterus may be seen sometimes eaten away to near the fundus, without the remaining part being materially altered in structure.

2. Corroding ulcer, like the ulcer of cancer, generally goes on though at a slower pace to a fatal termination, but certainly in some cases the disease has appeared to be ultimately cured by the efforts of nature, or by the use of local applications; and this is a termination which we assuredly never see in true cancer.

Diagnosis. The general and local symptoms of corroding ulcer are those characteristic of cancer. The attendant pain is usually not very acute. The diagnosis between it and cancerous ulcer can be only accurately made by vaginal examination, and by watching the effects of treatment. The great point of distinction consists in the fact, that before carcinoma has gone on to ulceration, it

has in general been already preceded by such a quantity of morbid deposit in the cervix uteri and neighbouring tissues, that on examination by the vagina and rectum, the uterus itself is found to be much more fixed and immoveable than it is in the healthy state, and the cavity of the pelvis is more filled up. On the other hand, in cases of corroding ulcer we find by the same examination, that so far from being more fixed, the uterus is equally if not more moveable in the pelvis than in the natural state, while the space around the cervix is not occupied by any deposition of new or foreign matter.

Treatment. The general indications of treatment in this disease are in their principles and details the same as those laid down in regard to carcinoma of the uterus. In corroding ulcer, however, we have one great additional rational indication in the employment of local applications calculated to arrest the ulcerative process, and excite a healthy action in the surface of the sore. Various means have been proposed and employed to attain this end. The applications of the solid nitrate of silver, muriate of antimony, solutions of corrosive sublimate in nitro-muriatic acid, and several other analogous stimulant and caustic substances have each been recommended by different authors. In the treatment of lupus we know well how seldom one kind of application agrees for any great length of time with the disease, and the same seems to hold good with regard to corroding ulcers. The application must, we believe, be repeatedly alternated, and probably practitioners have hitherto erred in the treatment of this affection in two different ways, viz., by applying medicine too powerfully caustic, when they have used local application, and by not persevering with sufficient assiduity in the employment of such mild local measures as we find useful in treating similar ulcers on other parts of the body. In the local treatment of a case of this kind, the speculum is an invaluable instrument in enabling us to make the applications that may be deemed necessary more directly to the affected part, and to it alone.

OTHER MORBID DEGENERATIONS OF THE STRUCTURE OF THE UTERUS.

Cartilaginous and osseous transformation.—Phlebolites.—Hypertrophy and atrophy.—Substances in the uterine cavity.

THE uterus is also liable to a number of morbid states and degenerations of minor importance.

Cartilaginous and osseous transformation. The walls of the uterus are occasionally the seat of cartilaginous and osseous transformation, independently of the presence of fibrous tumours. Either of these morbid conditions may occur throughout a large portion of the parietes of the organ, or they may be found only in particular parts of it. We have observed them most frequently in the higher part of the cervix, where they sometimes produce complete, or nearly complete, obliteration of the os internum. Cartilaginous and osseous degenerations are rarely found in the substance of the uterus itself, except at very advanced periods of life; but we have seen an approach to both of these states, and in the coats of the uterine vessels, at a comparatively early age.

Phlebolites are more frequently found in the uterine and adjoining veins than in those of any other part of the body; and we have found them there, in all stages of their progress, from simple fibrinous coagula to small solid calcareous masses. We believe these phlebolites to be a much more common morbid appearance in the uterine veins than they are generally reported to be.

Hypertrophy and Atrophy of the uterus are states which are occasionally met with, independently of any connexion with other coexisting forms of organic

disease. A diminution of the uterus, in regard to volume, may be very generally observed in females, who die at an advanced period of life; but this state can scarcely be said to be one of morbid atrophy.

Hypertrophy of the walls of the uterus, around the site of fibrous tumours, is a very common appearance. We have seen the uterine parietes in the neighbourhood of such tumours nearly as thick as the contracted uterus immediately after delivery, and with its blood-vessels enlarged in a proportionate degree. But again, in other instances of the very same form of tumour, when little irritation had been excited by the presence of the morbid growth, and when the tumours were in near apposition, we have found the portion of the uterine parietes enclosing it evidently diminished in thickness, and in a state of partial but decided atrophy. In some cases we meet with a local atropy confined to one or both lips of the os uteri; and in other cases, the same parts are found in a state of local hypertrophy, and projecting downwards into the cavity of the vagina.

The cavity of the unimpregnated uterus is liable to be changed, both in its figure and volume, in some states of organic disease of the viscus. Indeed it is occasionally found to be partially or entirely obliterated, in cases in which organic and inflammatory disease has taken place in its walls, after the catamenial period of life has passed over. Both the shape and size of the uterine cavity are often found changed, when fibrous tumours are developed in considerable numbers in different parts of its walls. Under these circumstances the parietes of the organ often become enlarged and elongated, in proportion as the tumours themselves are developed, particularly when the tumours are situated towards the mucous surface.

The cavity of the uterus is at the same time lengthened, occasionally to the extent of several inches; and it may also be found irregularly contracted and dilated at different points.

The cavity of the unimpregnated uterus may be enlarged by the morbid accumulation of different fluid substances within it. Thus, when the catamenial fluid is not allowed to escape, in consequence of obliteration congenital or acquired of the os uteri, vagina, or external parts, the uterine cavity itself may become gradually distended to an enormous degree by the retention of the fluid within it. The same state, as we have already mentioned, occasionally, though rarely, takes place in instances of metritis, in consequence of large accumulations of pus within the uterine cavity. In this last case, the canal of the os uteri must necessarily be obliterated before the collection occurs. The mucous surface of the uterus and Fallopian tubes is in rare cases coated with a collection of true tubercular matter. This only happens in instances in which the tuberculous diathesis is otherwise well marked.

Substances in the uterine cavity. When the os uteri is accidentally shut up, especially at an advanced period of life, by the formation of tumours in that part of the organ or by chronic inflammation or other such causes, the cavity of the uterus sometimes become filled and distended by an accumulation of the mucous or sero-mucous secretion of its lining membrane. This constitutes the disease known under the name of *Hydrometra,* or *Dropsy of the Uterus.*

The fluid may vary in its qualities by admixture with blood, pus, &c. The quantity which may be accumulated within the cavity of the uterus in this disease is sometimes very great. The organ may be distended to a size equal to that which presents at the fifth or sixth month of pregnancy, and it has even been alleged, to an extent greater than the gravid uterus at the full time. Usually, however, long before any such extreme degree of distension takes place, the walls of the uterus, which in general become more and more attenuated as the accumulation increases, give way at some part or other from progressive absorption; or this result may be hastened by the supervention of ulcerative or gangrenous inflammation in a portion of the distended uterine parietes.

In hydrometra, as also in the other forms of morbid distension of the cavity of the uterus by fluid accumulations within it, the enlarging organ maintains pretty nearly the form and shape of the gravid uterus at different periods.   In such cases, we may meet with a layer of coagulable lymph or false membrane, continuous or interrupted, lining the surface of the dilated cavity.   This false membrane, which is merely the result of inflammatory effusion from the internal surface of the cavity, has, in some instances, been mistaken for decidua ; and in hydrometra, it has often been erroneously looked upon as the walls of a hydatid.

The cavity of the uterus may also contain solid bodies ; such as the separated polypi and womb stones (the nature and origin of which we have already described), accumulated coagula of blood, or of effused lymph and ova that have become diseased and arrested in their developement.   Acephalocysts have been found imbedded in the walls of the uterus, and may probably have passed in some cases from thence into the cavity of the organ.   But the morbid structure, known under the name of *Hydatids of the Uterus*, is of a very different nature, and consists merely of a diseased state of the membranes of the ovum, originating in a morbid persistance and developement of the villi of the early chorion.

It is unnecessary to dwell, in this work, upon the treatment required for the expulsion and extraction of foreign solid bodies from the uterus ; and in regard to hydrometra and other liquid collections within the cavity of the organ, we shall merely observe, that occasionally they each require to be evacuated by an artificial opening into the uterus, in order to avert the danger that would otherwise arise from their accumulating to such an extent, as to escape through the perforated or ruptured walls of the viscus into the cavity of the peritoneum.

INFLAMMATION OF THE OVARY, OR OVARITIS.

General observations.—Congestion and hæmorrhage.—Anatomical characters and termination of inflammation of the ovary.—Symptoms and diagnosis.—Causes and treatment.

THE morbid states to which the ovaries are subject are very diversified in regard to their pathological nature, but in a practical point of view by far the most important are, 1, inflammation of the organ ; and, 2, that complicated form of disease which is generally described under the common term of Ovarian Dropsy. We purpose in the first place to consider these two affections of the ovary in full detail, and afterwards to give a brief enumeration of the other organic diseases of a less frequent and less practical nature that invade this organ.

The general remark as to the rarity of disease in the internal sexual organs of the female during the earlier years of life, holds particularly true with regard to the ovaries.   Morbid lesions are very seldom indeed found in them previous to the age of puberty.   From the time, however, that the menstrual function is established, they are subjected to periodic congestions, to sudden changes in the state of the Graafian vesicles, to lacerations in their tissues, in consequence of the rupture of these vesicles, and to other morbific causes connected with derangements of the functions and consequences of menstruation, conception, and parturition, that, singly and conjointly, render the organs in question very common localities for diseased action in the female economy.

Congestion and hæmorrhage.   The ovaries are the seat of a marked functional congestion at each menstrual period, for some time after conception, and probably also under the excitement of sexual passion.   This congestion frequently terminates in small effusions of blood into the structure of the organ,

and still more frequently into the Graafian vesicles. Many of the slighter morbid appearances which we so constantly meet with in the ovaries of the adult female, may be traced to these apoplectic effusions. A great portion of the lesions, known under the name of *false corpora lutea*, are no doubt attributable to this source ; and we have often had occasion to trace the small effused masses of blood through all their series of changes, from a recent red coagulum, till they assumed a brown, yellowish, and ultimately a straw-coloured and fibrinous appearance, or were at least more or less completely absorbed. The degree of serous effusion accompanying these apoplectic clots modifies their appearance considerably. We have seen a true *corpus luteum* very exactly imitated in two or three instances in which the blood was still party-coloured, and coated the internal surface of a morbid Graafian vesicle that happened to have its walls thickened, and at the same time partially contracted and puckered in consequence of absorption of some of the effusion.

Inflammation. Inflammation of the ovary occurs both under the acute and chronic form. The acute variety is generally found in connexion with co-existing inflammatory action in the uterus, broad ligaments or peritoneum ; more frequently chronic ovaritis is found in an isolated and idiopathic form.

In the first stages of *acute* ovaritis, we find on dissection the organ reddened, injected, swollen, and generally softer than usual ; serous effusion takes place early into the structure of the organ, and when mixed with purulent infiltration as sometimes occurs, the mass of the ovary will be found in a friable and almost disorganized state. Coagulable lymph, also, is in general early effused upon the serous surface of the organ in acute ovaritis, and in the more chronic forms of this disease, this effusion often leads to the formation of extensive adhesions to the neighbouring peritoneal surfaces, or to the thickening and induration of the capsule of the ovary itself, or of the lining membrane of one or more of the Graafian vesicles.

When purulent effusion takes places, the pus, instead of being infiltrated into the tissue of the organ, is, particularly in some of the more chronic forms of the disease, collected into abscesses. These abscesses are generally small, and occasionally they are found to the number of three or four in the same organ. In other cases, however, one large abscess alone is formed, and distends the fibrous capsule of the organ to an excessive degree. The pus may again become absorbed, but much more frequently it leads to the ulceration and perforation or rupture of the containing cyst, and, according to the locality of the perforation, and the occurrence or non-occurrence of previous adhesions, it may be discharged into the cavities of the intestinal canal, urinary bladder, Fallopian tube, uterus or vagina ; or it may escape into the cellular tissue of the pelvic and iliac regions, and produce all the phenomena of an ileo-coccal abscess, as it may be evacuated into the cavity of the peritoneum itself. This last circumstance has repeatedly occurred in cases of acute gangrenous abscess of the ovary during the puerperal month, but it is rare under other forms of large abscesses in this region. We have, however, known it repeatedly to take place where the disease was chronic, and the purulent collection very small. The erisypelatous form (as it has been called) of peritonitis, has, within our own knowledge, been traced in repeated instances to the irritation produced by the bursting of such small ovarian abscesses.

Symptoms and diagnosis. The presence of acute ovaritis is principally marked by a feeling of heat and deep-seated pain in the corresponding parts of the pelvic cavity. This local pain is generally increased, if the patient suddenly assume the erect posture, and when the rectum is distended in the act of defæcation. It sometimes stretches down the corresponding limb or affects the loins ; and it is always liable to become much more acute in its character provided the inflammatory action spreads to the peritoneum. The function of the bladder is very frequently deranged, and the dysuria may be considerable ; more rarely we have tenesmus, combined with a sensation of bearing down in the pelvic

region when the inflammation spreads over the recto-vaginal reflection of the peritoneum.

After a time, when we press upon the lower part of the abdomen, we may detect a painful roundish tumefaction produced by the inflamed and swollen ovary ; but this can only occur when the organ is considerably enlarged.   In the earlier stages of the disease the transverse diaphragm, formed across the pelvis, by the septum of the broad ligaments and uterus, prevents us from being able to produce sufficient pressure on the ovaries behind it, to enable us to ascertain the existence of inflammatory tenderness in them, and, under these circumstances, it has of late been proposed by different authors to increase the certainty of our diagnosis by an examination per rectum.   We believe that in this way we may ascertain the existence of morbid tenderness in the vagino-rectal reflection of the peritoneum, which may be done also by a vaginal examination, and further that we may touch the ovary when it is much enlarged or distended with purulent matter ; but we entirely doubt the possibility, as a general rule, of the finger easily reaching the natural situation of the ovary, and ascertaining its degree of tenderness and swelling.   We have, in several examples, endeavoured to ascertain the truth and applicability of this diagnostic mark upon the dead subject, and find it altogether impossible to touch the ovary in situ, even with a very long finger, except where the pelvis is unusually shallow.

Ovaritis does not in general give rise to many constitutional symptoms, except when it is very acute, or spreads to the peritoneum.   We have then the heat of skin, quickness of pulse, and the other usual phenomena of inflammatory fever ; these are apt to assume a remittent type, with alternations of heat and cold, when the inflammation terminates in a collection of purulent matter.

When ovaritis is connected with acute inflammation of the uterus or peritoneum, its more particular symptoms are generally merged in, and masked by, those of the other disease.

In *chronic* ovaritis, the local symptoms, though less in degree, are the same in character with those accompanying the acute form.   There is sometimes, however, considerable irritation of the rectum, and disturbance in the function of the uterus.   The disease, in this form, is always obscure, except when it is the result of the acute variety terminating in abscess, when the previous history of the case, the physical signs afforded by the volume and fluctuation of the resulting tumour, and the use of the hollow exploring needle, may enable us to arrive at comparative certainty in the diagnosis.

When both ovaries are affected with chronic ovaritis, the menstrual discharge may be suspended : sterility frequently results, both from the thickened state of the capsule of the organs, and from the mode in which their surfaces, as well as the extremities of the Fallopian tubes, are fixed and bound down by adhesions and false membranes.

Causes.   The most common causes of ovaritis are the sudden suppression of the catamenia, or any established discharge from the internal organs, exposure to cold, particularly during the menstrual period, physical injuries, and especially those which are apt to supervene in connexion with parturition.   The disease has often been observed as one of the many morbid appearances in puerperal fever, and occasionally occurs also in the puerperal state, as an idiopathic affection. Some authors have alleged that is is liable to take place in the female when affected with gonorrhœa, and under the same circumstances as hernia humeralis in the male.   We have watched diligently for its occurrence in some hundreds of cases of gonorrhœa, that have been under our care in the Lock Hospital of Edinburgh, but have met with only one, and that a doubtful instance of it.

Treatment.   When acute ovaritis is combined with common or puerperal inflammation of the uterus or peritoneum, it will be best treated by the remedies

adapted to these particular diseases. When it occurs as a primary or idiopathic affection, it is unnecessary to direct against it, with greater or less activity, according to the intensity of the inflammation itself and the stage of disease, all the usual resources of the antiphlogistic treatment, such as general and local bloodletting, counter-irritation, diaphoretics, sedatives, &c. The local bleeding may be effected by applying leeches to the groin, vulva, or anus. Hot fomentations to these parts often give great relief; and we have found them most easily applied in the form of repeated warm poultices, medicated or simple, to the hypogastric region. Some practitioners place great reliance on the employment of calomel in different combinations. The bowels must be kept in a very soluble state, but all purgative medicines which in their operation irritate the rectum, must be avoided. The warm water enema under such circumstances is often of much use. The tenesmus, dysuria, and other symptoms of pelvic irritation, may require the use of strong opiate suppositaries and enemata, or the internal administration of combinations of hyoscyamus and camphor, and other remedies of a similar nature.

The chronic form of the disease requires little modification in the above treatment, except such as may be dependent on the diminished activity of the morbid action. Local bleedings and stronger external counter-irritation will here be requisite. Preparations of iodine and mercury may also be used.

When an abscess forms in consequence of ovaritis, acute or chronic, and is increasing rapidly into a considerable swelling, it becomes a consideration of serious moment to open it with the trocar, or, as has been recommended, with caustic, in order to prevent the bad effects which would necessarily result from its bursting into the peritoneum or cellular tissue of the pelvis. The place of opening will necessarily be regulated by the position and size of the collection; and in such cases it might be well, as we have already suggested, to make ourselves certain of the contents of the swelling, by the aid of the hollow exploring needle, before venturing to open into it in a more free manner.

DROPSY OF THE OVARY.

Simple serous cysts.—Dropsy and dilatation of a Fallopian tube.—Unilocular simple cyst, or dropsy of the ovary.—Ovarian cyst containing hydatids.—Compound or multilocular cystic dropsy of the ovary.—Symptoms and Diagnosis.—Prognosis.—Treatment.

UNDER this, as a generic term, several different diseased structures have been indiscriminately classified by practical writers. These structures vary considerably in their pathological nature and history, and have this character only in common, that they all consist of a morbid structure situated in the region of the ovaries and broad ligaments, and contain a greater or less proportion of encysted fluid contents. The principal varieties of disease that may, with a practical view, be classified under this head, may, we believe, be reduced to the following modifications:

1. *Simple serous cysts, clustered together and attached originally to the peritoneal surface of the broad ligaments, Fallopian tubes, or ovaries.* These cysts which are very frequently found attached to the parts that we have mentioned both in the human subject and in the lower animals, are generally small and pediculated, but sometimes one of these cysts, or several of them conjoined, acquire a very large size, and under this circumstance have been frequently mistaken for, and described as instances of true cystic degeneration of the ovary. We are acquainted with the history of more than one case in which very large tumours of a pelvic origin were mistaken, even after the abdomen was laid

open in the examination after death, for ovarian growth, until a more minute inspection showed that the ovaries were not implicated, and that the diseased structure had its origin in the broad ligaments.   We have dissected one case in which an enormous number of small cysts were scattered over the whole peritoneal surface of the internal sexual organs, and at the same time that the contiguous parts of that membrane were so intimately united to one another by morbid adhesions, that it required considerable care to separate them, and thus ascertain the true seat of the morbid cystic structure.

2. *Dropsy and dilatation of a Fallopian tube.*   The distension of one of the Fallopian tubes, by an accumulation of fluid within its cavity, takes place in some instances to such an extent, and with such an alteration in the appearance in the parts, as to lead both the practitioner and the pathologist to confound it with true ovarian dropsy.   If the dilated tube happen to be derived, as it sometimes is, by dissepiments, this mistake will only be the more readily incurred. The morbid changes of structure and situation, which frequently accompany this disease, render the discovery of its true nature occasionally a matter of considerable difficulty even in the dead body, and the volume of the resulting tumour is sometimes so great as to equal that of a very large ovarian dropsy. Several pounds of fluid have been repeatedly found in encysted dropsies of the tubes, and instances are on record, in which the accumulation has even amounted to upwards of twenty and thirty pints.

3. *Unilocular simple cyst, or dropsy of the ovary.*   Instances of cysts of the size of a cherry or hazelnut, and consisting of a diseased and distended condition of one or more Graafian vesicles, are very often met with in the dead body, without having given rise to any marked symptoms of disease during life.   We have often found the walls of these small cells of considerable thickness, of a strongly fibrous or almost cartilaginous structure.   But in the locality of the ovary, one single and very large cyst appears to be occasionally developed at the expense of the remaining part of the organ.   Very large unilocular ovarian cysts of this kind are certainly by no means common, and rarely reach such a magnitude as the other forms of ovarian dopsy.   We deem it unnecessary to inquire further into the primary pathological seat of such large unilocular cysts. They may, as we have just said, consist in some instances in an extreme degree of dilatation of one or more united Graafian vesicles, and we believe this to be their most frequent origin ; but in other cases, they may possibly depend on morbid changes in the common cellular tissue of the organ itself.

4. *Ovarian cysts containing hydatids.* • It has been avowed by some authors that large serous cysts may occur in the ovary, and contain within them a quantity of acephalocyst hydatids ; in other words, it has been maintained that one form of ovarian dropsy was to be referred to a collection of true hydatids in the organ.   We have not seen any such specimen in the various pathological collections which we have had an opportunity of examining, and we believe that few if any sufficiently authenticated instances of such a morbid lesion are to be found upon record.   Ruysch has delineated one case, but the fact of his bestowing vessels upon the parietes of the hydatid vessels renders even that instance more than doubtful.

5. *Compound or multilocular cystic dropsy of the ovary.*   This is certainly the most important type of ovarian disease which has been described under the name of ovarian dropsy, and constitutes by far the most frequent morbid structure which we find in large tumours in this region of the body.   Indeed, ovarian tumours of this kind very generally reach a large size before death ; but they may be found varying in absolute volume from a mass not much larger than the healthy ovary, to growths of such magnitude as to fill and distend the cavity of the abdomen, to an extent as great or even greater than the pregnant uterus at the full time of gestation.   The individual cells or cysts belonging to these tumours, differ exceedingly in number and size, and in the nature of their contents and parietes ; they are also liable to considerable variety.   In all compound

cystic ovarian tumours that have reached even a moderate size, the number of individual cells or cysts is very considerable, and sufficient at once to set aside the idea, that they can depend on a morbid distension of the natural vesicles of the ovary. In many cases indeed of this form of morbid structure, the number of cells may be described as almost interminable, for the larger of these cells have several successive clusters of smaller cells developed and developing upon their internal membrane, in a mode somewhat analogous to the geminiparous forms of generation among the lower animals. The general size of the individual cysts is sometimes pretty equal throughout the whole tumour; but very generally we find one set of cysts, or one single cyst, so disproportionately enlarged as to constitute almost the entire bulk of the tumour. In this latter case, the tumour may have many of the physical qualities of a unilocular cyst.

Multilocular ovarian tumours present great and striking differences in the nature of their contents. Their cysts have been found to contain all possible modifications of morbid animal substance, from simple serous effusion to different kinds of gelatinous, meliceritous, atheromatous, encephaloid, melanotic, and even calcareous matter. Occasionally, more or fewer of these different substances have been found in different cells in the same tumour. Most commonly, their contents consists of a glairy fluid serum, or of a gelatinous semifluid matter of a yellowish or straw-coloured tint. In some instances, this matter is discoloured by effused blood, or pus, and in others contains a quantity of cholesterine. The parietes of the cysts, or in other words the solid portions of the structure of this class of ovarian tumours, vary very much in different instances. We have occasionally seen the solid part of the tumour much larger in proportion than the fluid. In some cases the dissepiments between the individual cells are several lines or even more than an inch in thickness, whilst in other tumours, and even in other parts of the same tumour, they are so attenuated as to be perfectly transparent, or perhaps partially absorbed. In general, however, each individual cell is in itself a shut cavity, having merely a communication with one or more of the same cluster of cells.

The parietes are originally composed of a fibrous or fibro-cellular tissue, though this is itself liable afterwards to undergo various forms of morbid degeneration, and to become the seat of different diseased deposits. These parietes seem often to consist of a minute cystic structure. The lining membrane of the cells is generally of a smooth, glistening appearance, like that of serous membrane; but we have occasionally seen it displaying much more the character of a mucous surface, and it is liable to become coated with coagulable lymph, and to present the other effects of local inflammation. It is amply provided with the blood-vessels, ramifying in long and somewhat tortuous branches on the inner surface of the more distended cysts.

We have already said, that projections of greater or less size are very often seen on the internal surface of such cysts, and that these projections consist of a new developement of secondary but similar cells.

The tumours formed by the unilocular and multilocular varieties of ovarian dropsy are almost always pediculated. Often, however, in consequence of casual attacks of inflammation during their progress, they become adherent by their peritoneal surface to the neighbouring organs, and particularly to different parts of the pelvis. Their pedicles vary in regard to thickness and length. We have seen an ovarian tumour which filled and distended the whole abdomen, attached by a stalk not much larger than the thumb. In other cases, the basis of attachment, even of small tumours, is much greater and broader; and the pedicle, of whatever size, generally transmits several large blood-vessels.

Symptoms and diagnosis. In the earliest stage of the different varieties of ovarian dropsy which we have described, there are in general few or no symptoms which can render us at all certain of its presence; menstruation, in many cases, is certainly disordered, but, in other instances, remains natural during almost the whole progress of the affection; and, if one organ only is attacked,

the patient may even conceive and carry a child to the full time. Generally, towards the commencement of the disease, a sense of weight, dragging, and irritation is felt in the pelvic region, usually referred to one particular side, or to one particular spot of that region. After a time, the corresponding lower extremity becomes liable to œdema, or the patient complains of numbness in it; and dysuria, hæmorrhoids, constipation, or diarrhœa, and other symptoms, indicating compression and irritation of the organs and vessels of the pelvis, supervene. All these symptoms of this early stage of the disease are produced by the pressure of the ovarian tumour, whilst it is still contained within the pelvic cavity; and if an examination be at this time made, a fluctuating swelling of greater or less size may possibly be detected between the vagina and rectum. This tumour is in general still loose and moveable, unless it has already, through inflammatory action, become adherent to the walls of the recto-vaginal cul-de-sac in which it is placed. The ovarian cystic tumour, whilst it is still confined within the cavity of the pelvis, may be mistaken for early pregnancy, or retroverted uterus. From both of these, however, it may be distinguished by its gradual enlargement and very slow growth, and by careful examination through the vagina and rectum, which may enable us to ascertain that the tumour is a swelling distinct from that of the uterus itself.

The first stage of the disease, however, such as we have just described it, very often passes over without attracting, in any degree, the notice of the patient; and the tumour is not detected until it is large enough to have risen out of the pelvis and to have taken its place in the cavity of the abdomen. Indeed, it often happens that the first symptom by which the patient, or her medical attendant, really becomes aware of the actual presence of ovarian dropsy consists in the detection, through the abdominal parietes, of the tumour itself. This discovery of the tumour is sometimes made in consequence of symptoms of pelvic or abdominal irritation leading to the examination of these parts, or from the patient suffering from such local or constitutional symptoms as induce her to suppose herself pregnant. In other instances, the detection of the tumour is, at first, altogether a matter of accident; situated towards the mesial line of the body, it often arrives at a considerable size before its presence is detected. We were lately consulted in a remarkable case of this kind, in which an enormous, but flattened ovarian tumour, reached midway between the umbilicus and sternum, without the patient or her medical attendants being aware of its existence, until attention of the patient was particularly directed to it by the exaggerated reports of a case of abdominal enlargement which, at the time, occupied public notice.

The lateral situation of a cystic tumour of the ovary, and its origin from one of the iliac regions, is generally stated to form an important point in this diagnosis. It is an important sign whenever it can be distinctly traced, but it is, at the same time, not to be always expected, in consequence of the tumour generally stretching early towards the mesial line, or in other words, growing in that direction from which it meets with least resistance. Consequently, as we have said, when of considerable size, it is often found lying towards the central line of the abdomen; and when, as occasionally happens, the two ovaries are at the same time diseased, we may find them both meeting towards the centre of the abdomen. In such cases, we can generally trace distinctly the line of contact of the two tumours.

When the tumour has risen into the abdomen but is still so small as to float more or less freely in that cavity, it is always liable to produce various symptoms from its occasional changes of position. We know of more than one case, for instance, where in assuming the erect posture, the patient has been liable to incontinence of the urine (probably from the pressure of the tumour upon the urinary bladder), and where other nervous symptoms were liable to supervene, similar to those that accompany quickening, and arising apparently from the movements of the tumour in the abdominal cavity. Tympanitis is a very

common complication of this stage of the disease. The abdominal tumours formed by ovarian dropsy are generally slow in their growth, and take many months, in some instances years, until they enlarge to any very great extent. Occasionally they apparently become arrested in their enlargement, and remain for a long period of a limited size, whilst in other but more rare instances they fill and distend the whole abdomen in the course of a few months. As the tumour enlarges and distends the abdominal parietes, the cutis of the lower abdomen cracks and fissures as in pregnancy, and large varicose veins are seen spreading their net-work over its surface, an appearance which is met with also in ascites. Cystic ovarian tumours when examined through the abdominal parietes, or through the vagina and rectum, may present either a smooth and equal surface, or may feel unequal and tuberose on its surface. This last is particularly the case when the tumour is of a compound or multilocular character.

When the ovarian collection enlarges considerably, and rises in the abdomen, it displaces, like the pregnant uterus, the intestinal canal upwards and laterally. Hence we have one source of distinction between large ovarian dropsies and simple ascites, in the dull sound, on percussion, over the anterior abdominal region, and the more prominent parts of the tumour in the former disease. In ascites, on the other hand, the intestines generally float in the effusion, and give out a resonance on percussing the abdomen in its more elevated parts; such as the umbilical and epigastric regions, when the patient is placed upon her back. The fluid, in ascites, always gravitates towards the lower part of the abdominal cavity, when the patient is placed, as she ought to be in all dubious cases, in different positions, while the ovarian tumour remains comparatively immobile under the same circumstances. The ovarian enlargement is generally circumscribed, while the ascitic collection is more diffused, and imparts further a more decided sense of fluctuation. After the tumour has risen into the abdominal cavity, it has often been mistaken for the pregnant uterus, but it may be distinguished from it, by ascertaining through vaginal examination the empty condition and natural size of the uterus itself, by the absence of ballotement, and of the more positive signs of pregnancy, and by there being no proper relation between its degree and mode of developement and that of the impregnated uterus. It must, however, be recollected that a sound similar to that of the placental soufflet has been heard in the enlarged vessels of ovarian tumours, and therefore cannot be relied upon as a certain means of distinction.

Cystic ovarian tumours when examined through the abdominal parietes, or through the vagina and rectum, may present either a smooth and equal surface or may feel irregular and tuberose on the surface. This last is particularly the case when the tumour is of a compound or a multilocular character, and sometimes, in that form of the disease, particular inequalities are found firm and indurated, while others are soft and fluctuating.

The degree of fluctuation, traceable in ovarian dropsies, is varied by a number of circumstances. When the walls of the tumour are thick and fully distended, it almost imparts the feeling of a solid body; when the tumour consists of an aggregation of small and unequal sized cells, the fluctuation is often still very indistinct; but it becomes much more so when any of the cells near the anterior surface of the tumour are very large, or when it consists only of one or two large cysts. Indeed, if we except the deduction to be derived from the equal or tuberose condition of the surface of these tumours, we shall find that the only other great distinction between the unilocular and multilocular cyst, consists in their comparative degree of fluctuation, this symptom being much more marked in the former than in the latter. But occasionally, even in unilocular cysts, when the contents are gelatinous and semi-solid, the fluctuation is by no means very marked.

The tumour formed by an ovarian dropsy is not essentially tender on pressure, but it is always liable to become so from the occasional inflammation of its peri-

toneal covering, or from inflammatory action being set up in its interior. In a few cases, however, neither of these latter contingencies happens during the whole course of the disease, and then the tumour may attain a fatal size without contracting adhesions, through peritoneal inflammation, to any of the neighbouring surfaces.

We have hitherto spoken only of the more local symptoms of ovarian dropsy. In its very earliest stages, the mammæ sometimes become sympathetically irritated, and more or fewer of the constitutional symptoms of pregnancy may be present. Such complications, however, we believe to be very rare; but towards the latter stages of the disease, and when the tumour has become so much enlarged as to fill the whole or the greater part of the pelvic and abdominal cavities, an extensive range of constitutional symptoms is developed by the general irritation which it produces, and by its interference with the functions of various important organs. From the pressure of the enlarged and enlarging tumour upon the different abdominal viscera, their functions become seriously embarrassed, and dyspnœa and palpitation are superadded from the compression even of the thoracic viscera. Dropsical effusions, marasmus, and hectic, supervene, and more or less rapidly undermine the remaining powers of the patient; or inflammation and disorganization in the tumour itself ensue, and hasten the fatal issue.

Prognosis. The different forms of ovarian dropsy, and different cases of the same form, do not by any means always follow the same course, or present the same peculiarities in their progress and termination. The particular variety of ovarian dropsy to which we have adverted, as consisting of a cyst with true hydatids, is so very rare, that we know only of its history from the analogy of similar degeneration in other organs. If we leave it therefore out of view for the present, we shall find that the simple cysts, forming the three first varieties of the disease, as already described, differ most essentially from the fifth or compound cystic dropsy of the ovary, inasmuch as the former are not necessarily either permanent or malignant. The latter, on the other hand, probably very rarely if ever disappears, and its course in general is slowly though decidedly fatal. After it has once fully formed, however, it certainly appears in some cases to remain in an inactive and stationary state for a very long series of years, and is hurtful principally from its mechanical weight and pressure. In others it passes onwards through its different stages of developement and disorganization, within the course of a few months after it is first observed, and leads to a fatal termination within the year. Between these two extremes, we meet with every intermediate degree in the duration and danger connected with this disease. It is impossible, we believe, to point out any precise marks, which would entitle us to form a very decided opinion of the probable course of any individual case; but if the growth of the tumour be steady though not rapid, and particularly if it suffer repeated attacks of inflammation, the disease in all likelihood will not run a very protracted course.

The more simple forms of ovarian dropsy which consist of single cysts, are certainly sometimes removed by the effects of nature, or by the interference of art. The fluid contents of the cyst would appear to become in some rare instances gradually absorbed, or adhesive inflammation occurs in and obliterates the cyst, or the cyst becomes ruptured and perforated. In this latter case, it may discharge its contents into the abdominal cavity, or if it has previously formed adhesions with some hollow viscera, it may evacuate itself into the cavities of these viscera, or through fistulous openings at the umbilicus or groins. These terminations, however, even in cases of single or unilocular cysts, are rare, and form remarkable exceptions to the rule rather than the rule itself.

The recorded histories of some cases of ovarian disease, which from their symptoms were supposed to be of a multilocular character, have, we must confess, greatly surprised us, in regard to the allegation of their ultimate and complete removal and cure. We can suppose the possibility of such an occurrence

in cases of simple ovarian cysts, but whoever has examined attentively the structure of a multilocular ovarian tumour, even of very moderate magnitude, will be ready to confess the utter hopelessness of its removal, either by nature or art. In the cases of supposed cures of such disease, there must, we are inclined to think, be something radically wrong in the diagnosis, and we might quote various high authorities to show how easily such a mistake might occur, and the best practitioners be deceived, in consequence of swellings occasionally forming in the iliac and adjoining regions, and resembling ovarian and other abdominal tumours in many points, but consisting apparently only of some morbid states of the abdominal parietes, or of partial inflations and distensions of the intestinal canal with fluid and fæculent matter. These swellings have been seen to resemble ovarian tumours even in regard to their duration, as well as most of their physical characters, and are only with certainty to be distinguished from them by their occasional changes in volume, by the presence of marked hysterical symptoms, and by the ultimate favourable progress of the case. The *post mortem* inspections in such cases of supposed cure of ovarian cystic dropsy would be extremely valuable, from the negative if not from the positive information which they might convey. In two of the instances in which the operation of extirpation of an ovarian dropsy has been attempted in Britain, no tumour whatever has in reality been found in the abdomen, after this cavity has been laid open by the knife. The true pathology of such deceptive cases of abdominal swelling is certainly at present a great desideratum in practical medicine.

Causes. It is perfectly necessary to dwell upon the different causes which have been alleged to give rise to ovarian dropsy, because we have no information on this subject which can be as yet considered as sufficiently precise and well established, except the circumstance that the variety of the disease which consists in dilatation of the Fallopian tube seems to be legitimately traceable to previous inflammatory obliteration of the extremities of that canal.

Ovarian dropsy is seen to occur both in the married and unmarried ; indeed, no age is entirely exempt from it. It is frequently not remarked till a very advanced period of life ; most generally it occurs during the active period, or towards the decline, of the reproductive functions ; in a few cases it has been observed in the child before puberty, and we have even seen the commencement of it in the fœtus in the existence of serous cysts attached to the broad ligaments.

It has occurred occasionally so often in members of the same family, that it has been considered to be hereditary

Treatment. The treatment of ovarian dropsy may be divided into, 1, the employment of measures of a medical nature ; and, 2, the adoption of different surgical operations for its partial reduction or complete removal.

Medical treatment. Various classes of medicines and numerous individual remedies have been at different times employed and lauded in the treatment of ovarian dropsy : diuretics, diaphoretics, sialagogues, purgatives, and even emetics have been each in turn supposed capable of removing the effusion. In particular, several different species of diuretics have been had recourse to with this indication, and with alleged good effect. At the present time, little faith is placed in the action of any internal remedies in the treatment of this disease, and it certainly seems as hopeless a task to endeavour to remove the organized cyst or cysts, and fluid contents of an ovarian dropsy by internal medicines, as it would be to produce the absorption of the structure and contents of a local or external encysted tumour, by the same constitutional means.

The remedies which are at the present day principally employed by British practitioners for the purpose of resolving ovarian collections are the muriate of lime, different preparations of mercury and iodine taken internally or applied locally to the hypogastric regions. It is more than doubtful, however, if they possess any immediate efficacy in removing or even in arresting the disease.

In constitutions in any way debilitated, the two latter remedies often more than counterbalance any good effects that they might otherwise be expected to exert upon the local disease, by their injurious agency upon the general health of the patient. And, assuredly, one great indication which we ought to follow in the treatment of this and of other analogous diseased states that are little amenable to medical treatment, is to keep the patient's system as near the standard of health as possible; for, by this means, we in general possess indirectly much more power over the progress of the existing morbid action than we have directly through the medium of any class of remedies.

At the same time, however, that we thus express our doubts of the efficacy of any known therapeutic measures in procuring the resolution of ovarian dropsies in either their first or subsequent stages, we by no means intend to deny that all medical treatment is useless in the progress of the disease. On the other hand we often observe the greatest benefit from measures directed to the treatment of the various complications that are so apt to arise during the progress of the malady. In particular, the use of general or local bloodletting, and other antiphlogistic means, is often called for in consequence of inflammation arising in the substance or walls of the tumour. In some cases these attacks may never occur, or occur very rarely, but in others they are extremely frequent, and excited by very trivial causes. In every instance it is an indication of paramount importance to subdue these inflammatory actions as speedily as possible, for they seem, as a general rule, to have a great and deleterious influence over the progress of the disease, by hastening the morbid actions within the tumour, increasing its effusions, sometimes disorganizing its interior, and often leading to morbid adhesions between its peritoneal surface and those of the adjoining viscera, that may immediately or subsequently lead to distressing consequences.

Some practitioners would seem indeed to rely upon small bloodlettings and local counter-irritants and issues, as almost a means of absolute cure in ovarian dropsies; and, though we certainly do not believe that they can remove the disease, we are strongly of opinion that, in some cases where the tumour has a tendency to rapid increase, these means will be found more or less effectual in checking its progress, by restraining the local, congestive, and inflammatory actions which seem so much under these circumstances to hasten its developement and disorganization.

Local friction, percussion, electricity, and galvanism, have each had their supporters in the treatment of ovarian dropsy, but none of these measures seem worthy of confidence.

In some cases, where the tumour was loose and moveable in the peritoneal cavity, we have found an abdominal bandage afford the patient considerable relief.

Irregularities in the functions of the bowels, bladder, and uterus often distress the patient much in ovarian dropsy, and sometimes require for their correction the best directed efforts of the practitioner. Occasionally the mechanical impediment to the discharge of the rectum or bladder, caused by the presence of the whole ovarian tumour or of a part of it in the cavity of the pelvis, has defied all medical treatment, and been at once relieved by pushing upwards the impacted portion of tumour above the brim of the pelvis.

Surgical treatment. After an ovarian dropsy has passed through its first stages, and has become fairly formed, no measure seems calculated to afford any permanent prospect of relief, except a surgical operation; and it must at the same time be confessed, that surgical interference in this disease has hitherto been followed by very unsatisfactory results.

Various surgical operations have been proposed for ovarian dropsy, some only as palliatives, and others with the view to the radical cure or complete removal of the disease. We shall briefly allude to the principal operations that have

been suggested, and content ourselves by referring, for a description of the different steps of each, to works on surgery.

1. *Paracentesis, or tapping.* This is the operation which is most frequently practised in ovarian dropsy by British surgeons. It may be employed either as a temporary palliative in order to reduce in a greater or less degree the volume of the swelling, or it may be had recourse to under the hope of producing the permanent and complete removal of the effused fluid. From what we have already stated, with regard to the different forms of ovarian dropsy and the intimate structure of the enclosing cyst, it will be evident, that tapping can only be performed with this latter indication in the unilocular variety, and in cases where the fluid effusion is limpid and serous. Even in these cases, however, the operation very rarely succeeds in effecting a permanent cure. In the multilocular variety of ovarian dropsy, where the fluid is retained in separated isolated cysts, tapping can only be of use as a palliative, and that too only when one or two of the constituent cysts are enlarged to a much greater extent than the others, and may give relief by the evacuation of their contents. When the component cysts are small, and all nearly of an equal size, and their contained fluid is, as very often happens, of a gelatinous consistence, the operation is perfectly useless, as only the one or two cells which are opened by the trocar will be evacuated, and that, with great difficulty, in consequence of the consistence of their contents.

It has been proposed to perform the operation of tapping at a very early stage of ovarian dropsy, and when the tumour is still small and confined to the cavity of the pelvis, or is lying in one of the iliac fossæ. We are not aware of any instance in which the operation under these circumstances has been successfully resorted to. Indeed, it seems to be a rule very generally followed, though not very generally acknowledged, in regard to tapping in ovarian dropsy, that it is not to be employed except when the health of the patient is in more danger from the mere mechanical size of the tumour than what is likely to result from the operation itself. Consequently, it is usually resorted to only after the disease has fully formed, and has acquired such a size as to demand surgical relief, though only as a palliative, and at the risk of the dangers of the operation.

Before resorting to tapping, in this affection, it may be well to weigh, in each case, the disadvantages and dangers of the operation against the benefits that are to be expected from it. We must recollect that, 1. The fluid is always extremely apt to accumulate, very few instances of the reverse, or, in other words, of the permanent removal of the fluid by this operation having been hitherto put upon record. When once commenced, therefore, the operation requires to be repeated from time to time. 2. Difficulties may exist in regard to the operation : and the benefits, expected to be derived from it, may be counteracted by the cysts being small and multilocular, or the effused fluid so viscid as to render its escape, through any ordinary opening, a mechanical impossibility. 3. In cases in which the operation is performed with ease, the patient may nevertheless sink, in consequence of direct exhaustion after the cyst is evacuated ; or inflammation of the peritoneum, or of the walls of the cyst may supervene, and lead to a dangerous, if not a fatal, result.

3. *Obliteration of the cyst by adhesive inflammation.* Some surgeons have attempted to produce in the walls of the ovarian cyst, after its fluid has been evacuated by tapping, a degree of inflammation sufficient to produce adhesions between the opposed surfaces of its lining membrane. In fact, in this way, the radical cure of hydrocele has been attempted upon ovarian dropsy, but certainly by no means with success sufficient to encourage its repetition. The cyst, for the purpose in question, has been injected with stimulating fluids in some instances, and irritated by the presence of a seton in others. Where the walls of the inflamed cyst are the seat of projecting secondary cysts (as we have shown them to be in many cases), we should scarcely expect the inflam-

mation to produce sufficient adhesions, provided we dared to venture upon the experiment of exciting it.

If we desired an ovarian dropsy to act upon the same principles as those which guide surgeons in the treatment of hydrocele of the tunica vaginalis, it would probably be safer to imitate them in their late attempts to produce absorption of the fluid and adhesive inflammation in the walls of the cyst, by the use of acupuncture needles, aided by the action of galvanism or electricity. We might, certainly, decompose the fluid by galvanic needles, and then that fluid itself might, possibly, act as an irritating and foreign body upon the lining membrane of the cyst; but would the inflammation thus lighted up be followed in any case by sanatory results, in regard either to producing the ultimate absorption of the effusion, changing the action of the cyst, so as to repress its further secretion, or leading to its obliteration? Such results could scarcely be expected where the cyst or cysts are large, and it would be of little or no use in the multilocular form of the affection. Are there any cases of the disease in its early stage, in which it would be more likely to be of more benefit?

Incisions into the diseased ovary. It has been proposed to make an extensive incision into the swelling through the abdominal parietes, so as to form an external fistula communicating with the cavity of the tumour; and again, it has been suggested to make such an incision in the parieties of the ovarian collection, as would allow it to evacuate its contents into the cavity of the peritoneum, where, it is conceived, they might be removed by the peritoneal absorbents. The former operation has been practised, and in one or two cases with a favourable result, but we are not aware that the latter has ever been attempted, and we should fear greatly, that it would lead to the excitement of inflammation of the peritoneum rather than to a simply increased action of the absorbent vessels of that membrane.

These two operations of large incisions into the ovarian tumours, though less frightful, can scarcely be considered as less dangerous than their complete excision.

4. *Extirpation of the ovary.* This formidable operation has been practised in two different methods, namely, 1, by freely opening up the abdomen, and extirpating the ovarian tumour in its entire state; and, 2, by making a smaller incision through the abdominal parietes, evacuating the tumour by tapping, and immediately afterwards pulling it out, in its empty and collapsed state, and cutting it off as nearly as possible to its root.

The latter of these operations, though the safer and less difficult in its execution, could never, of course, be made available in cases where the tumour was composed of an aggregate of small cysts, and further, the adoption of either must always be liable to very great difficulties and danger in its execution, from 1, the chance of the existence of such morbid adhesions of the tumour to a neighbouring viscus, or to the abdominal or pelvic peritoneum, as would prevent its displacement and extraction; 2, the size of the blood-vessels supplying the tumour, and the difficulty of properly securing them; 3, the probability of the disease being joined with carcinomatous degeneration of the organ, and the inutility of its removal under such circumstances; 4, the dangers more immediately accompanying the operation, such as exhaustion, hæmorrhage, and particularly peritoneal inflammation.

When we consider these several circumstances in relation to excision of the ovary, and take also into account the mistakes that are liable to be made in the very diagnosis of the tumour, and the difficulties surrounding the actual performance of the operation itself, in the abstract, we should undoubtedly be inclined to condemn it unconditionally as a surgical resource which ought to be avoided and rejected. But at the same time we freely confess, that in looking over the recorded histories of this operation, and thus appealing, as far as possible, to facts alone, we have felt surprised at the comparative success which has

accompanied its performance. Thus, out of about thirty operations, to the histories of which we have reference, not above one in four died, which is nearly the average mortality in lithotomy. In several, the operation could not be completed in consequence of adhesions, and in others, the result was not satisfactory, though the patient survived. In about half the cases, or in fourteen or fifteen instances in all, the operation has been more or less completely successful. Dr. M'Dowell has recorded not less than five successful cases. (*Good's Study of Medicine*, edited by Dr. Doane of New York, vol. ii. p. 590.)

We do not state these results for the purpose of encouraging the greater frequency of extirpation of the diseased ovary. On the other hand, we believe that there are very few, if any cases, in which it can be justifiable. It is no doubt the only means by which we can hope completely to remove the multilocular ovarian cyst; and that form of cyst, we believe, has no marked tendency like carcinoma to malignant reproduction, though, when abandoned to itself, its strictures undergo morbid changes and actions which almost always inevitably prove fatal after a greater or less relapse of time. Excision is also the only certain means of fully eradicating an unilocular cyst. The operation of tapping may certainly palliate both forms but, as we have already said, it very seldom indeed proves the means of permanent cure. In an immense proportion of cases it requires to be repeated again and again; and thus, while it acts as a palliative for the time being, in as far as regards the constitution and symptoms of the patient, it often tends to hurry on the disorganizing processes, which are apt sooner or later to occur in the structures composing the tumour, and this is also in itself an operation certainly though slowly dangerous.

In the uncomplicated forms of ovarian dropsy, when no adhesions with the neighbouring organs exist, and when the tumour is decidedly pediculated, the operation of excision may certainly be performed with less danger to life than was some years ago supposed; but we still want sufficient means to enable us to make a sure and correct diagnosis of such cases. In some of the instances to which we have above alluded, the abandonment of the operation, even after the abdomen was laid open, shows that it has been repeatedly attempted in cases for which it was not at all suited. But again most of those cases which are most favourable for the operation are exactly those which give the patient comparitively little distress, and that may reasonably be expected to go on for a considerable time, possibly for years, without materially affecting the health or life of the patient. If in such a case an adhering and pediculated tumour give rise to any such symptoms as totally destroyed the comfort of the patient, or threatened any immediate danger, then possibly the alternative of an operation might become a question of serious consideration. These cases, however, we repeat, are exceedingly rare, and we cannot, we think, better close these observations on the treatment of ovarian dropsy, than by quoting, as applicable to that disease at the present time, the remarks which Dr. William Hunter published upon his experience in it, upwards of half a century ago. "I have had occasion (he observes) to see a great number of encysted dropsies of the ovary, many of them treated by physicians of the first rank, and yet have never seen one cured; nor have I ever known one case of that kind, where the cyst has been sensibly diminished in bulk by any other means than the trocar. If I may form a judgment from what I have seen both in the living and dead body, I should believe that the dropsy of the ovaries is an incurable disease, and that a patient will have the best chance of living longest under it, who does the least to get rid of it."

STRUCTURAL DISEASES OF THE OVARY.

Hypertrophy and atrophy.—Morbid transformations and simple tumours.—Cystic tumours containing hairs, &c.—Malignant degenerations.—Symptoms of the preceding ovarian diseases, and their treatment.

Hypertrophy and atrophy. The ovary is occasionally found hypertrophied. The diseased change may implicate all the tissues of the organ, or may affect its proper tissue, or its fibrinous coat alone. This fibrinous coat is indeed very often thickened, either throughout its whole extent, or in parts only in the aged female. Under such circumstances the tissue of the ovary is not unfrequently found in a state either of induration or cellular atrophy. In many instances the partial thickening of the fibrinous coat appears to take place around the seat of old cicatrices.

It often happens that we meet on the dead body with hypertrophy of one or more of the Graafian vesicles, its cavity being enlarged, its coats thickened, and as we have stated above, not unfrequently there are the remains of effusions of blood, or of coagulable lymph, upon its internal surface. We have repeatedly seen this effused blood of a colour almost as black as a melanotic deposit.

Morbid transformations and simple tumours. The ovaries are not unfrequently the seat of various forms of morbid transformation and diseased growths, generally leading to induration of the organ. Its fibrous coat is liable to cartilaginous and ossific degeneration, and the proper internal structure of the organ passes more rarely into the same varieties of morbid transformation. Generally, however, before doing so, the ovarian structure itself undergoes a change into the intermediate forms of morbid fibrous tissue.

Occasionally, true fibrous tumours, resembling in their pathological nature those of the uterus, form in the ovary or in the broad ligaments. These tumours occasionally acquire an immense size. We have a specimen of this morbid structure, taken from a tumour in the ovarian region, that weighed fifty-six pounds. It had been first observed about twenty years previously to death, in the right iliac region. It was then of the size of an egg, and had gradually increased from that period till at last it rose as high as the diaphragm, and compressed even the cavity of the chest. The circumference of the abdomen after death was five feet four inches. The tumour was quite moveable within the abdomen, and was only attached at two points, namely, by a few old, cellular adhesions to the larger omentum, and by its original pedicle to the right broad ligament in the site of the ovary. This last organ was apparently incorporated with the morbid mass, or at least was not visible. The artery and vein of the ovary passed into the tumour, and were of enormous size. The uterus was healthy. In one portion the tumour was softened and disorganized, probably from compression of the vessels of that part and consequent gangrene. We know the histories of two tumours of the same character and of nearly the same size which were found on dissection to be attached by their pedicles to the broad ligaments, and to be totally independent of the ovary.

Cystic tumours, containing hairs, &c. The ovary, as has been previously pointed out, is a common seat of tumours of a cystic character. It is also by far the most common locality in which we meet with those remarkable species of cystic growths, that consist of morbid formations of cutaneous, pilous, dental, and bony tissues. Such tumours occasionally reach a large size, and contain a considerable quantity of hair with a number of teeth, and sometimes tissue of the structure of the nails. The teeth are generally found in a cartilaginous or

osseous band crossing one side of the cyst or walls of the tumour, the cavity of which is always filled with a quantity of fat, or steatoid matter, which we believe to be quite peculiar to this form of growth. We have known a tumour of this kind impede delivery, and its fatty contents, when evacuated by the trocar, made the nature of the obstructing mass at once certain. In a practical treatise such as the present, it is unnecessary to enter into the conflicting opinions with regard to the pathological nature of such tumours, although the consideration of it forms at the present time one of the most interesting subjects, in morbid and teratological anatomy.

Malignant degenerations. Solid structures of a malignant nature may become developed in the ovary. We have seen instances both of carcinoma and of true encephaloid disease in this organ, but still they are rare. These affections are seldom primary, and are generally found after the same diseased state has betrayed itself in other viscera. The same remark applies to true melanosis, which is rarely found in this organ, unless as a secondary seat of the deposit.

Many pathologists include the compound cystic tumour of the ovary (which we shall describe in the sequel as the most frequent form of ovarian dropsy) among the malignant growths pertaining to this organ. It agrees with carcinoma in some points of its history, but differs from it in others. Thus, the peculiar form of structure, constituting the multilocular cystic tumour (the *areolar* or *gum cancer* of some authors), whether occurring in the ovary or elsewhere, has no tendency to repeat itself in a secondary form in different and distant organs of the body ; or, in other words, it is not at first, nor does it during its progress, become a constitutional disease ; although, on the other hand, it generally shows a more marked disposition than even carcinoma itself to spread from tissue to tissue, and from organ to organ, through mere continuity of structure. We have seen it, in this way, transforming into one common cystiform mass the contiguous portions of the stomach,—omentum, transverse colon, and under surface of the liver. The isolated character of the ovary prevents it showing this peculiar tendency in that situation ; but we have known it to affect, and produce its peculiar form of degeneration in the tissue of the omentum, when it happened to be bound to the diseased ovary by strong adhesions. The compound cystic tumour may co-exist with true carcinoma in the ovary, or may form (like any other tissue, either healthy or morbid) the seat of malignant deposits ; but that, we conceive, is only an incidental circumstance, and cannot be regarded as a part of the natural history of the disease. It has little or no tendency to recurrence, or reproduction, in the locality from which it is once fully removed. Further, the compound cystic tumour often becomes, in its latter stages, partially broken up in its interior, and some of its cells may show marks of ulceration ; but these changes may be traced to the effects of inflammatory and gangrenous disorganization, and are not results of the internal destructive degeneration peculiar to growths of a truly malignant character. Carcinomatous and melanotic tumours of the ovary seldom reach to a great size, but occasionally the encephaloid disease here forms a swelling as large as the head of the adult, and passes more or less rapidly through all the stages peculiar to that affection, as it is seen in other organs. On the other hand, the compound cystic tumour, as we shall afterwards see, often increases to such an enormous size as to fill and distend the cavity of the abdomen, and even to press up the diaphragm.

Symptoms. The ovary is isolated both in its anatomical situation and physiological functions, and its diseases excite so little sympathetic action in any other viscera that, in general, we have no marks of the existence of any of the preceding morbid changes of structure in the organ, as long as its mere volume is not much increased. If the disease, however, should produce considerable enlargement of the organ, we may then have different symptoms induced : 1, in consequence of derangements in the functions of the uterus, rectum, and neigh-

bouring viscera, from the mechanical pressure and irritation of the tumour ; and, 2, we may have, as a guide, the physical characters of the tumour itself. The details which we have given in relation to these two sets of symptoms under ovarian dropsy, apply equally to the preceding set of morbid degenerations.

When both ovaries are affected, the function of menstruation will be arrested, and sterility follow as a consequence. Further, in these ovarian growths, we have occasionally a set of symptoms superadded in consequence of inflammation arising in the tumour, and the last stages of malignant disease, the constitution may present all those symptoms which usually accompany the advanced progress of such affections.

Treatment. In cases of ovarian disease, such as those which we have thus briefly described, medical treatment, when required, is generally limited to the reduction of inflammatory action when it does supervene, and to the alleviation of the complaints induced by the mechanical pressure and irritation of the tumour. The means of fulfilling these two indications have been stated in detail in the chapters on INFLAMMATION OF THE OVARY and OVARIAN DROPSY.

The remarks that we have made under the head of OVARIAN DROPSY, in regard to the extirpation of ovarian tumours, will, with slight limitations, apply to the removal of very large pediculated tumours of a simple fibrous character in the same situation.

In the ovary, as in other internal organs affected with carcinoma, encephaloid disease, or melanosis, medicine is of no use except as a palliative, and the resources of surgery are equally unavailable.

HÆMORRHAGE.

GENERAL DOCTRINES.

Definition.—Preliminary observations.—Spontaneous hæmorrhages.—Different tissues from which these occur.—Mode of escape of the blood—by rupture of vessels, and by exhalation. —Arguments in support of the doctrine of hæmorrhage by exhalation.—Spontaneous hæmorrhage, a symptom of constitutional disturbance, or of local disease.—Active and passive hæmorrhages.—Symptomatic and sympathetic.—Diagnosis of spontaneous hæmorrhages.— Characters of the blood effused.—Observations on constitutional hæmorrhages.—States of the constitution favourable to them.—Their periodicity.—Vicarious hæmorrhages.—Symptoms attending active hæmorrhages.—Passive hæmorrhages.—Explanation of the cause of the extravasation of the blood in active and passive hæmorrhages.—Effects of hæmorrhage, local and general.—Treatment of constitutional hæmorrhages—of periodical—vicarious— active—passive.—Observations on symptomatic and sympathetic hæmorrhages.—Hæmorrhages considered with reference to their seat—into the substance of organs—cutaneous— from serous membranes—from mucous membranes.

HÆMORRHAGE (αιμορραγια, from αιμα, blood, and ρηγνυμι, I burst or break). The term Hæmorrhage thus signifies the bursting forth of blood from the living body ; the escape of the blood from those vessels in which it is always contained in a healthy state of the system.

In the present day a very large class of important diseases is collected together, and described under this title, *Hæmorrhage*, whether the extravasated blood escapes from the body by some of the natural external openings, or remains pent up in some closed cavity or viscus : whatever may be the cause of the extravasation of the blood, still the morbid phenomenon would in the present state of medical science be classed among the hæmorrhages. It frequently happens that a very considerable loss of blood is sustained in consequence of some accidental injury of the arteries or veins, or by ulceration of their coats ; whenever the vessels so injured, or the trunks from which they arise, are within the scope of the senses of sight and touch, the surgeon is called upon to arrest the hæmorrhage by the application of the ligature. It is not our intention in the present article to consider any of these forms of hæmorrhage, which more properly belong to the province of surgery, but simply state that all these hæmorrhages, which are consigned to the care of the surgeon, are the result of appreciable injury to the blood-vessels. Those forms of hæmorrhage, which are usually committed to the care of the physician, are much less perfectly understood : they frequently take place without any perceptible alteration in the anatomical condition of the part whence the blood escapes ; and are therefore controllable with less facility and certainty. They arise from some pathological condition of the body itself, and may be entitled *spontaneous*. The history and treatment of these spontaneous hæmorrhages are detailed in the following article.

Upon some occasions a sudden hæmorrhage appears to constitute a whole disease; that is, it is only the morbid phenomenon that we can detect: at other times it forms the principal sign or indication of local disease; while, lastly, an escape of blood may be merely an accidental symptom.

There is scarcely a structure of the body which may not suffer from the spontaneous effusion of blood from its vessels. Hæmorrhages are of frequent occurrence from the mucous membrane of the nostrils, pharynx, trachea and bronchi, stomach, intestines, urinary organs and uterus: they are more uncommon from the serous coverings of the lungs, heart, brain, and the abdominal organs: they take place into the cellular tissue in many parts of the body: they occur in the parenchyma of the brain, the lungs, the liver, and the testicle: they likewise take place into the substance of the skin as well as from its free surface.

It will be interesting, and productive of a better understanding of the pathology of hæmorrhages, if we first consider the conditions under which the blood escapes from the vessels of the different tissues. It is true that hæmorrhage from some of the before-mentioned organs, as the stomach, the intestines, the lungs, and the brain, does occasionally result from the rupture of some vessel or vessels of cognisable magnitude; but it is no less certain that, in by far the greater number of these spontaneous hæmorrhages, there is no lesion of structure, either of arteries or veins, so far as the most careful dissection informs us. From the earliest dawn of medical science it must have been known, that the accidental division of a blood-vessel was attended with loss of blood; and hence the older pathologists, prior to the cultivation of morbid anatomy, reasoned by analogy, that wherever an effusion of blood occurred in the living body there must be a rupture of a blood-vessel. It was by careful dissections that Morgagni demonstrated that this notion was in many instances erroneous: and subsequently Bichat (*Anat. Gén.*) promulgated and established the now generally received pathological doctrine, that the great majority of these spontaneous hæmorrhages are the result of an exhalation from the ultimate ramifications of the minuter blood-vessels, which constitute the capillary system. Andral (*Précis. de Pathol. passim*), Chomel, (*Dict. de Méd.* art. HÆMORRHAGIA), and other pathologists of more recent date, have illustrated and firmly established this doctrine of hæmorrhage by exhalation; and Dr. Watson, in a most perspicuous article on hæmorrhage, has given an able digest of the observations and arguments by which this doctrine is supported. Judging, he says, from the writings and language, even of medical men, it does not appear to be so generally known or acknowledged as it ought to be among *them;* and among unprofessional persons, the old errors upon this subject prevail almost universally. To break or burst a blood-vessel, in the most literal meaning of those words, is thought by the public, and by some at least of the profession, to be a misfortune of very common occurrence; yet, relatively to the frequency of hæmorrhage, it is certainly a very rare one. (*Cyc. Pract. Med.*) The opportunity here afforded of dissipating a widely entertained error ought not to be neglected, and we shall therefore not hesitate to reproduce the principal arguments by which the doctrine of hæmorrhage by exhalation is supported. As hæmorrhages from mucous membranes are far more frequent than from other tissues, so will they afford us the readiest means of establishing this principle in pathology. Thus, where hæmorrhage has occurred so profusely from the stomach or bowels, that the death which ensued has been sufficiently accounted for by the mere loss of blood, the whole tract of the alimentary canal has been diligently examined, and has exhibited no breach of surface, nor any perceptible alteration of texture. Sometimes the mucous membrane appears, here and there, of a red colour, and, as it were surcharged with blood; sometimes it is pale and transparent, while the vascular network, visible immediately beneath it, is gorged and turgid: sometimes the whole is colourless, the same network of vessels having been completely emptied by the previous hæmorrhage; and

sometimes, again (and this is illustrative of the mode by which the blood has issued) vast numbers of small dark coloured masses, like grains of fine sand, can be made to start from the surface of the membrane by slight pressure. There can be no doubt that these are minute portions of blood, which had remained and coagulated in the vessels or apertures forming the ultimate channels of the hæmorrhage. (Watson, *op. cit.* ; Andral, *op. cit.* vol. ii., p. 151.

Bichat places in the foremost rank this species of evidence, by which alone, after all, the existence of hæmorrhage, independent of any rupture of vessels, can be satisfactorily established. He states, that he had often opened the bodies of patients who had died during an attack of hæmorrhage, and that he had had the opportunity of examining, with reference to this very point in pathology, the surfaces of the bronchial tubes, of the stomach, of the intestines, and of the uterus ; that there never was the least apparent trace of any laceration or lesion of those membranes, although he took the precaution of carefully washing their entire surfaces, of allowing them to macerate in water, and at the same time of examining them with powerful lenses. (*Op. cit.*)

Numerous and conclusive observations of a similar kind might be cited from the records of morbid anatomy, which is so extensively cultivated in the present day ; and in this way direct proof is obtained, not only that hæmorrhage may take place from the surfaces of internal mucous membranes by exhalation, but that this is the mode in which it most commonly happens ; that the effusion of blood by any of the natural outlets of the body can seldom be explained by the detection of any rupture of the coats of a blood-vessel.

Bichat also supported this doctrine of hæmorrhage by exhalation by the following considerations, which, although full of physiological interest, are by no means so convincing as the former. He states that if the uterus of a female who dies during menstruation be carefully examined, we cannot discover either any actual erosion of vessels, or any of those scars which ought to be so numerous, if at each menstrual period the uterus were really the seat of so many successive lacerations of its internal membrane. Such lacerations, if they took place, would indeed account for the bloody discharge, and some suppose them to take place in other membranes whence blood has been poured forth. It is by no means certain, however, that such lesions of surface, especially in mucous membranes, would leave permanent traces of scars. Punctures even of the skin, made by fine needles, which wound the blood-vessels, do not, we believe, leave any marks of their former presence. Bichat adds, that if the same uterus be submitted to pressure, and the surface be carefully watched, we see minute drops of a bloody fluid exuding from the exposed membrane : and if we then wipe away this fluid, the surface of the membrane, which has yielded the bloody fluid, is discovered to be unbroken. (*Op. cit.*)

Whatever support the doctrine of hæmorrhage by exhalation derives from the phenomena of menstruation, the following interesting case, observed by Dr. James Hamilton of Edinburgh, affords it in the most striking manner. A woman was afflicted with enlargement and complete prolapsus of the uterus. The inverted womb is described as having hung down between her thighs as large as a quart bottle ; it could not be replaced ; it was tense and hard, except during the periods of menstruation, which took place regularly. At those times it became soft and flexible, and the menstrual discharge was seen by numbers of medical men and of students to issue guttatim from the exposed surface. (*Cyc. Pract. Med.* art. HÆMORRHAGE.) As, however, Dr. Watson remarks, the process of menstruation cannot be looked upon as a morbid process ; as in the unpregnant female, during a certain portion of her life, it is not only consistent with perfect health, but actually essential to it ; and as the fluid so poured out is not strictly blood, the analogical argument drawn from the preceding facts in favour of hæmorrhage by exhalation, though it may afford a strong presumption, is not decisive.

But any deficiency in the cogency of the two preceding arguments is supplied by the careful observation of those rare but well-authenticated cases of cutaneous hæmorrhage, where a dew of blood appears upon some part of the surface of the body, and which, being wiped away, again appears, without any perceptible change in the bleeding surface beyond a blush of redness.

But it is not only from the observation of mucous membranes and the skin pouring forth blood from their surfaces, that we are assured that hæmorrhage takes place by the process of exhalation.   Bichat states that he had upon many occasions scrupulously examined the internal surface of the peritoneum, of the pleura, and of the pericardium, in cases of hæmorrhage from those membranes, and that their surface appeared to him entirely free from any laceration, so that it was very evident to him that the exhalants had poured forth the blood in place of the serum which they previously secreted.

If it be demonstrated, says Chomel, that there does not exist any rupture of the blood-vessels in these cases of hæmorrhage from the mucous and serous membranes and the skin, there remains open to us, in the present state of medical science, only one mode of explaining the escape of the blood; it can only take place through the same channels as pour forth the mucus, the serum, and the sweat.   (*Dict. de Méd.*)   There seems no more necessity, under the action of disease, for a rupture of vessels to give exit to the blood, than to give exit to these fluids.   What the vessels or outlets to which we give the name of exhalants are, how they are distributed and arranged, in what manner they are connected with the ordinary capillary circulation of red blood, or under what influences they are placed, are points concerning which we have little or no certain knowledge.   We know, indeed, that such channels must exist, though we cannot see or demonstrate them; and that whilst the health is good, they do not allow the blood, as such, to pass through them.   Having thus produced facts and arguments which, as we believe, establish the truth of the doctrine of hæmorrhage by exhalation, it would seem that this class of diseases should be regarded as analogous to morbid secretions, and in any nosological arrangement be placed in the same class with dropsies and mucous discharges, and it is in this light that they have been regarded by Andral.   (*Op. cit.*)

Spontaneous hæmorrhages are symptoms of very different morbid states; sometimes the effusion of blood is a sign of general constitutional disturbance; sometimes merely of a local affection.

Those hæmorrhages which may be termed *constitutional* are attended by very opposite symptoms; and hence pathologists have long been in the habit of dividing these into *active* and *passive* hæmorrhages.   Hæmorrhage also occurs as a symptom of very different local affections.   Thus we witness hæmorrhage which obviously arises from some disease of the organ whence the blood is poured forth; and this may be termed *symptomatic:* again, we have a similar hæmorrhage taking place in consequence of obstructed circulation of the organ, produced by disease in some other part; and this may be designated *sympathetic*. In every hæmorrhage, from whatever part it may take place, the practitioner has to consider whether it be a symptom of constitutional or local derangement; whether the constitutional symptoms are of an active or passive nature; or lastly, if the affection be local, then whether it is to be regarded as symptomatic or sympathetic.   We believe that the successful treatment of this class of diseases will mainly depend upon their accurate diagnosis in the first instance. We admit that in practice this is sometimes attended with considerable difficulty.

The foregoing arrangement of the spontaneous hæmorrhages differs in some respects from that adopted by authors of undoubted merit, as Chomel, Watson, Latour, &c.   We do not ascribe much importance to any nosological classification, but are of opinion that hæmorrhages may be clearly ascertained to occur, 1, as symptoms of constitutional disturbance independent of local lesions, and, 2, as symptoms of manifest changes of structure in different organs.

Diagnosis.   Although the escape of blood from the vessels is a phenomenon

so striking, that in the greater number of instances there can be no doubt about the source of the hæmorrhage, still, when the blood is not immediately ejected, either in consequence of its traversing some long canal, or from being poured out into some part which does not communicate with the surface of the body, it may be difficult to decide upon the real nature of the case. Our diagnosis is then formed mainly from the constitutional symptoms which accompany copious losses of blood, together with the signs of local distress, particularly such as are induced by pressure. But a far more frequent and important difficulty arises when the physician attempts to decide, whether the hæmorrhage is to be regarded as constitutional, or symptomatic of some local disease. This difficulty is sometimes so great, that the prudent practitioner generally suspends his judgment for a time, until he can learn more of the history of the case, and observe the further progress of the symptoms, both local and general.

With respect to the quantity and quality of the blood poured forth in spontaneous hæmorrhages, nothing can be stated with precision. The quantity may vary from a few drops to several pints; but when there is a succession of hæmorrhages at short intervals of time, the quantity lost is sometimes quite astonishing. Patients, however, generally overrate the quantity effused upon any one occasion.

The blood itself is generally more fluid and brighter in proportion as it is effused rapidly, in large quantity, and near the surface of the body; more coagulated and darker in colour in proportion to the length of time that it has remained within the body after its escape from its proper vessels. The condition of the blood rejected will however materially depend upon the organ whence it is effused, and even assists in determining the diagnosis.

Constitutional hæmorrhages. These hæmorrhages often appear to be the result rather of some peculiarity of constitution, than of any pathological condition of the system; they take place in the more robust as in the most delicate; sometimes they are confined to one organ: in other cases the effusion of blood is from many different parts of the same individual in succession, *viz.*, from the nostrils, the bronchi, the stomach, the intestines, the uterus, or the skin. These constitutional hæmorrhages occasionally assume a periodicity almost as regular as that of menstruation; when they recur periodically, it is generally at intervals of a month, and the blood is usually poured forth with great regularity from the same organ, most frequently from the rectum or nostrils. At each recurrence of hæmorrhage a train of peculiar premonitory symptoms may often be detected; the discharge lasts a given time, and the quantity of blood lost is pretty nearly the same. If an habitual periodical hæmorrhage be interrupted, we generally find that some derangement of the health is either the cause or the effect of the intermission. These periodical hæmorrhages seldom continue throughout life, and in this respect they closely resemble the phenomena of natural menstruation: in the great majority of cases they do not commence before puberty, and they either cease or appear at longer intervals in the latter periods of life. As their accidental interruption may always be regarded either as a cause or effect of disordered general health, so when they become excessive they must, like profuse menstruation, be regarded as indications of disease. When these habitual periodical hæmorrhages have been accidentally arrested, we sometimes observe, sooner or later, a very remarkable and interesting physiological phenomenon, *viz.*, the appearance of a hæmorrhage in some other part of the body, and from which it continues to recur periodically. Such hæmorrhage is often spoken of as vicarious. Thus, if habitual hæmorrhois be interrupted, the person will perhaps be seized with periodical discharge of blood from the bladder, the stomach, the nostrils, or more rarely from the bronchi. Here, again, we may trace a close analogy between habitual hæmorrhages in the male and natural menstruation in the female. The celebrated Dr. Gall used strenuously to maintain the doctrine of a periodic movement in the male system, analogous to that which returns

monthly in the female, and marked by signs which all might detect, who would take the pains to look for them. That the analogy really obtains in some point, and more distinctly in some individuals than others, the foregoing observations clearly indicate.

Whenever we meet with periodical hæmorrhages in the female from any organ but the uterus, it is generally found upon investigation, that such discharge of blood is supplemental of suppressed menstruation, and continues with great regularity until the uterus has resumed its healthy functions. These supplemental or *vicarious* hæmorrhages commonly take place by the same organ on each occasion; sometimes, however, by different organs. It is almost always in this supplementary manner that the rarer forms of hæmorrhage are met with, and particularly those from the skin. Indeed, the only instance of cutaneous hæmorrhage which has fallen under our observation, was in a case of amenorrhœa. A predisposition to hæmorrhage from various parts of the body, upon the receipt of slight injuries, sometimes appears to be a family peculiarity, which, like many others, may be hereditary. One of the most remarkable cases of this kind is cited by Andral. In a family consisting of five children, all boys, the eldest accidentally bit his tongue, when the hæmorrhage which took place from the wound was so excessive, that the child died from loss of blood; the third and fifth of these boys had the same unfortunate tendency to hæmorrhage; the second and fourth boys, on the contrary, were remarkably healthy.

The third boy at the age of five years, and the fifth at fifteen months, were at various times affected with an eruption on the thighs and legs of livid spots or patches; these gradually swelled to the size of a pigeon's egg, and then became of a greenish-yellow colour. No bleeding took place from these swellings, unless they were accidentally or intentionally opened, when hæmorrhage occurred, and the flow of blood did not cease until the little sufferer fainted. The blood which escaped at first was red, but before it ceased became more like water stained with blood, and then the livid spots disappeared. Pressure with the fingers on the wound continued for several hours, was sufficient to repress further hæmorrhage; but it was observed that a real coagulum never formed to close the wound. These children recovered the loss of blood very slowly; but they continued otherwise healthy, until the hæmorrhage was accidentally renewed.

The elder of these two boys once lost a considerable quantity of blood from a decayed tooth; the younger had not the hæmorrhagic constitution to such an extent. Neither of the parents nor any relatives of these boys suffered in a similar manner. (*Bull. des Sciences Méd.* Avril, 1828.)

There are other hæmorrhages which are entitled to be considered constitutional, and which are preceded and accompanied by symptoms indicating derangement of the several functions of nutrition, of circulation, and of the nervous system; they are more strictly pathological than the foregoing. Some of these are attended with signs of fulness of blood, or plethora, and by increased activity and power of the circulation. These constitutional hæmorrhages have been usually described as *active*, while other hæmorrhages are accompanied by symptoms of constitutional debility, with an impoverished and altered condition of the blood, with diminished powers of circulation. These hæmorrhages have been contra-distinguished from the former by the title of *passive*.

It is not our intention to assert, that all constitutional hæmorrhages must necessarily belong to one of the two foregoing orders. Several varieties of hæmorrhage have already been pointed out, as arising rather from peculiarity of constitution than from actual disease; but whenever the hæmorrhage is an accidental occurrence, and attended by symptoms of general constitutional disturbance, it will be found to bear the characters of the active or passive forms of disease. In well-marked cases, the distinctive characters of these two

forms of constitutional hæmorrhage are sufficiently decided.   They have been described by Chomel in nearly the following words :—*Active hæmorrhages* occur in persons who are young and robust, who live fully, who make blood fast, and who are subject to the influence of those causes which tend to produce plethora.   Occasionally the hæmorrhage can be traced to some sudden accidental exciting cause, as violent exercise, mental emotions, a large meal of stimulating food, great heat of the atmosphere, a sudden chill of the surface of the body, or any other cause which may increase the force and frequency of the heart's action, or which may repel the blood from the surface upon some internal organ ; more frequently, however, the hæmorrhage seems to be the consequence of the predisposing causes merely.   (*Dict. de Méd.*)

The actual escape of blood is generally preceded by a train of peculiar symptoms.   The person experiences a general feeling of indisposition, with obscure and wandering pains that gradually settle in the part from which the blood is about to be discharged ; the face flushes, and sudden heats come over the surface of the body ; the pulse is generally frequent, full, bounding, or jerking, often accompanied with a peculiar thrill, which characterizes the tendency to hæmorrhage, so that this kind of pulse has sometimes been called a hæmorrhagic pulse.

A series of local symptoms, such as sensation of weight, of distension, of tingling or heat, is felt in the part, which, if it be within the scope of observation, sometimes appears red and swollen ; there is increased force of the arterial pulsations, and turgescence of the veins, indicating an unusual afflux of blood towards that part of the body whence the blood is about to escape ; while chilliness, paleness, and shrinking of distant parts, as of the hands and feet, denote an opposite state of the circulation in them.

In active hemorrhages the blood commonly escapes with rapidity ; it is of a florid red colour, and has the characters of what is vulgarly termed rich healthy blood ; it rarely proceeds from more than one part ; it readily coagulates, though it seldom separates completely into crassamentum and serum.   In proportion as the blood continues to flow, the signs of local congestion or hyperæmia disappear ; the person is sensible of relief, and feels stronger, more lively, and less oppressed than before ; the heart ceases to act with inordinate force ; the pulse regains its freedom and natural condition ; and the circulation becomes more equable through the extremities.

This kind of hæmorrhage is, as has already been mentioned, its own remedy, and ceases after the discharge of a certain quantity of blood.   Should the quantity lost be excessive, then we witness the usual train of symptoms resulting from the great loss of blood.

Passive Hæmorrhages are characterized by symptoms and consequences of an exactly contrary nature.   They occur in individuals who are naturally feeble, or who are weakened by disease, fatigue, imperfect nourishment, or profuse discharges.   The flux is not preceded by constitutional excitement, nor followed by any relief, but, on the contrary, by an aggravation of the general symptoms.   The effused blood is generally dark, serous, and little disposed to coagulate ; it would be commonly described as poor blood ; it often oozes slowly for a considerable period, and from several organs at the same time.   If the quantity of blood lost be considerable, the previous debility is greatly aggravated ; the activity of the heart is not diminished ; the face, the lips, the tongue become pale ; the complexion assumes a peculiar waxen tint, and the surface of the body loses its temperature.   The hæmorrhage thus leaves the individual in a worse state, and does not suspend the further escape of blood ; indeed, passive hæmorrhages both resist the means of cure, and are more likely to recur in proportion as they have been profuse, or have continued for some time.

We shall now proceed to indicate those conditions which appear most favourable to the occurrence of either form of constitutional hæmorrhage, and thence direct attention to the most probable explanation of the cause of the escape of

the blood.   We have already stated that active hæmorrhages occur in persons
who are exposed to the influence of those causes which tend to produce plethora.
To understand precisely what is meant by this state of general plethora, it is
necessary to remember the physiological doctrine, that the whole vascular
system is constantly distended beyond the caliber of the vessels when free from
any distending force.   When the flow of blood through the arteries is diminished,
their caliber contracts, and frequently they become even impervious.   The cor-
rect notion of plethora is, that this state of distension of the vascular system is
greater than what it is presumed to be in health.   It is easy to perceive, that
in persons who live fully, and who lead an inactive life, there should be a
greater quantity of blood formed, and consequently a preternatural distension of
vessels.

Fulness of habit and a florid complexion are some of the more obvious
marks of the existence of general plethora.   We also trace its effects in the
tendency of local capillary congestions or local hyperæmia, to inflammation,
and, lastly, to hæmorrhage.   The frequency of local congestions, combined
with local hæmorrhage in plethoric individuals, gives support to the hypothesis,
that, in the so called spontaneous active hæmorrhages, the issue of blood results
from pressure, whereby the entire blood is urged through passages, naturally
impermeable by its coloured globules, but now mechanically dilated, in conse-
quence of the *vis-à-tergo*.   Although the dilatation of the pores in the walls of
the capillary vessels cannot be made evident to the eye, this seems the simplest
and most obvious explanation applicable to those forms of constitutional hæmor-
rhage called active, as well, indeed, to those which result from obstacles to
the circulation through an organ.

Hæmorrhage has been ascribed, also, to some alteration in the pores or aper-
tures through which the healthy exhalations are transmitted from the capillary
vessels.   This change is considered to partake of the nature of morbid debility,
or relaxation, and very different from that produced by the distension of plethora.
That such a state of the capillaries may sometimes exist, is not unlikely, par-
ticularly in those constitutional hæmorrhages termed passive, where the effusion
of blood takes place from several parts in succession, or at the same time ; but
as we are altogether ignorant of the natural condition of the exhalants, it is
difficult to reason about the alterations to which they may be liable in disease.
This hypothesis derives support from the occasional efficacy of astringent sub-
stances, which, when taken into the system, check the further effusion of blood,
as they do other exhalations, namely, sweat and serum.   (Watson, *Med. Gaz.*,
vol. x.)

Another mode in which the occurrence of hæmorrhage has been explained
(Andral, *op. cit.* vol. i.), and which is principally applicable to the passive forms
of the disease, is by a supposed alteration in the consistence or composition of
the blood itself, which becomes attenuated, and capable of passing through
channels or orifices that healthy blood cannot permeate.   In defence of this
supposition may be adduced the facts, that hæmorrhages are known to occur
where the blood is obviously more thin, pale, and serous than natural ; and still
more remarkably, where that fluid has undergone further demonstrable changes
in its chemical nature, or is even visibly altered in its sensible qualities, as, for
example, in purpura hæmorrhagica, scorbutus, typhoid fevers, malignant small-
pox, and erysipelas.   These hypothetical attempts to explain the processes by
which hæmorrhage takes place, deserve, as Dr. Watson has observed, more
attention than is sometimes paid to them.   The views which they involve can
scarcely be regarded as mere speculative refinements ; for they often exercise
a real, though perhaps an unacknowledged, influence upon our practice.   At
any rate, if they do not, prior to experience, justify certain modes of treatment,
they accord wonderfully with what experience has taught concerning the means
by which hæmorrhage may sometimes be stayed or prevented.   In some cases
we succeed by measures which tend to abate the general force of the heart and

arteries, and to lessen general plethora, or by diverting partial plethora and restoring the disturbed balance of the circulation, or by directly emptying the turgid capillary vessels. In other cases we rely chiefly upon expedients which we believe to have the effect of constringing the extreme vessels : styptics to the bleeding part ; cold to the surface of the body, producing a sympathetic shrinking in other related membranes ; or internal medicines, which use has shown to have the property of restraining the natural exhalations when in excess. And, finally, there are cases where we seek, and not in vain, to repair the blood, to restore it to its natural condition by improvements in diet, or by food of a peculiar kind, such as the juice of lemons ; and thus the tendency to hæmorrhage is cured. (*Cyc. Prac. Med.*)

It will here be desirable to consider rather more in detail the effects of hæmorrhages both local and general.

The local effects depend a good deal upon the organ whence the blood is effused ; and also, whether that organ has any natural outlet to the surface of the body. The general effects on the constitution vary much according to the quantity of blood lost, and the rapidity of the effusion.

The local effects are always manifested in the disturbance of the functions of the organ whence the blood escapes ; if the trajet of the blood towards the exterior be short, and the communication of the bleeding organ with the surface be easy and uninterrupted, then the oppression of the suffering viscus is soon removed ; and, after a shorter or longer time, its natural functions are restored, as is evident after attacks of epistaxis, hæmatemesis, or menorrhagia. If, on the contrary, the bleeding part do not communicate immediately or very freely with the exterior, then, after a hæmorrhage, a long train of after-symptoms follow, which are more or less serious according to the importance of the organ affected. Such phenomena we observe after bronchial, or renal, or intestinal hæmorrhage. If the surface whence the blood flows have no natural outlet, as the serous membranes, particularly the arachnoid, the pericardium, or the pleura, then the local effects of the hæmorrhage are very serious on account of the effused blood becoming a source of permanent pressure and irritation to the important organs invested by those membranes. These local effects of hæmorrhage are aggravated to a much more alarming extent, when the blood is effused into the minute parenchyma of an organ, or into the interstitial cellular tissue ; the functions of the organ are not only interrupted, but its structure is generally permanently damaged. These various local consequences of internal hæmorrhages must be borne in mind, as they materially modify the prognosis in different cases.

With respect to the constitutional effects of spontaneous hæmorrhages, if the blood be poured out rapidly, and in large quantities, we witness similar phenomena to those which occur when a large quantity of blood escapes from some wounded vessel ; but should there be a succession of hæmorrhages from the same or different parts of the body, and only a moderate quantity of blood be lost on each occasion, then we witness phenomena much more permanent.

The appearance of persons whose systems have been gradually drained of the vital fluid by repeated hæmorrhage is very striking, and often at once leads the experienced physician to detect the existence of a disease, of which the patient himself may have been unconscious. The skin of such persons is deadly pale, or has a clear waxen hue : it would seem as if the little remaining blood did not reach the surface of the body, or as if nothing but a serous fluid circulated through the skin ; the conjunctival vessels appear bloodless ; the lips and ears are blanched ; the tongue, the lining of the lips and mouth have a pale yellowish tint ; the hands and feet are cold and shrunk, while the head is hot, and there is an occasional pink flush on the cheeks ; the respiration is hurried on the slightest bodily exertion. In more severe cases the skin is covered by a cold perspiration, and the legs are œdematous. Sooner or later, after repeated hæmorrhages, the heart recovers from its first state of debility, and the stage of

reaction commences : evinced by palpitation of the heart, beating in the epigastrium and in the course of the aorta, and an increasing throbbing of the carotids, the temporal and other arteries of the cranium. The pulse is generally frequent, or easily excited by the least mental or bodily exertion, and it then communicates to the finger a peculiar thrill or vibration, which is apt to deceive and impart the sensations of power or hardness : firm, continued pressure with the finger, however, soon convinces that the artery does not expand with real power. It is activity without power. This apparent energy of circulation alternates with occasional syncope, particularly if the person suddenly assume or preserve for some time the erect posture, or make any continued muscular effort.

This activity of the circulation gives rise to many symptoms of disturbance of the nervous system. Thus the violent pulsation of the carotids is followed by distressing throbbing pain in the head, sometimes accompanied with intolerance of sounds and light, requiring complete abstraction from the influence of both ; at other times the retina becomes almost insensible to light, the pupil remains dilated, and there is a transient state of amaurosis, the patient complaining of a sensation of tightness, as if the cranium were bound round by a cord. More alarming symptoms of disturbance of the cerebral functions occasionally supervene ; delirium and even confirmed mania may be the ultimate effect of the loss of blood. The functions of other organs, as the lungs and the alimentary canal, are also much embarrassed by the insufficient supply of blood ; but it is in the nervous system and the circulation that we trace the most manifest constitutional effects of successive attacks of hæmorrhage.

Treatment of constitutional hæmorrhage. The general rules of treatment only can be laid down here, because very considerable modifications must necessarily be adopted, according to the organ whence the blood flows ; to these the attention will be directed when hæmorrhages from particular parts are described.

We shall first advert to the treatment of those hæmorrhages which recur from time to time, generally from the same organ, and which from their periodical recurrence bear considerable analogy to natural menstruation. The seat of these hæmorrhages is most commonly the mucous membrane of the rectum or the nostrils, although they occur in other parts. It seems to be agreed by nearly all writers, that they are not to be interfered with by the *nimiâ medici diligentiâ*, unless under special circumstances : 1, if they become excessive, they must be restrained ; 2, if they are deficient in quantity, they must be encouraged ; 3, if they are entirely suppressed, they should be renewed ; 4, if they change their seat, and some other organ pour forth the blood vicariously, it is generally better to endeavour if possible to induce a return of the hæmorrhage to its former situation.

1. Although these habitual or periodical hæmorrhages generally occur to the most robust, nevertheless they appear in persons of delicate constitutions, and thus the means to be resorted to for repressing the excessive flux of blood will be different, according as the constitutional symptoms are sthenic or asthenic. The means to be adopted will be more particularly described in the treatment of active and passive constitutional hæmorrhages.

2. To encourage a deficient discharge of blood, all those means must be adopted which tend to produce a local congestion of the blood-vessels, or to determine the circulation towards the part. These indications may be accomplished by position of the part ; by the application of local stimulants, or irritation, in the neighbourhood of the part,—particularly by the various methods of increasing its temperature, by hot fomentations, by immersing the part of the body in a hot bath : the blood may be drawn to the vessels of the part by the application of hot mustard cataplasms on the adjoining surface, or by dry cupping in the neighbourhood. Should the foregoing attempts to restore a sufficient discharge of blood fail, then local depletion by cupping, or, better still, by the repeated application of a few leeches in the neighbourhood, will supply the place

of the hæmorrhage, and to a limited extent will also cause a determination of blood in that direction. The practitioner must, however, remember that these constitutional hæmorrhages, whether periodical or not, continue throughout life, and generally decrease in quantity with advancing years. He must therefore be guided by this knowledge in his attempts to solicit the discharge of the accustomed quantity of blood.

3. When habitual hæmorrhage is altogether arrested, the suppression is almost invariably the effect or the cause of considerable constitutional disturbance. If the total cessation can be ascribed to some accidental circumstance, as sudden disease of a distant organ, then, when that disease is overcome, with the returning health we often observe a return of the former habitual hæmorrhage; but should it not be renewed, its continued suspension becomes the cause of serious disturbance of some other organ, more or less closely related to the part whence the blood habitually flowed. Thus the continued interruption of an habitual hæmorrhoidal flux is almost sure to be followed by great disturbance of the functions of the stomach or of the liver, and ultimately of organs not so intimately related, through the circulation to the rectum, as the brain or lungs. Again, if habitual epistaxis be suspended, it is generally replaced by some affection of the brain, the lungs or the skin. Hence we see the importance of restoring such hæmorrhages when entirely suspended.

4. The habitual hæmorrhage may have ceased, and some other organ may have commenced pouring forth blood with great regularity. Under these circumstances it is almost invariably desirable to re-establish, if possible, the original hæmorrhage. This object must always be attempted when menstruation is suppressed, and some other organ as the stomach, the intestines, the rectum, bladder, or some part of the skin, pours forth a vicarious hæmorrhage. Some rare cases of deviation in the seat of the hæmorrhage however may occur, where the metastasis is unimportant or even favourable: thus, habitual epistaxis may be replaced by hæmorrhois, or this latter may occur after repeated attacks of hæmatemesis, and the change may even be regarded in a favourable point of view. Should any deviation of repeated attacks of bronchial hæmorrhage take place, the metastasis to the alimentary or urinary passages is to be considered a favourable event; but as a general rule, when a metastasis has taken place, we should employ all the means we possess of determining the flow of blood towards the original seat of the habitual hæmorrhage, and remove as far as possible those causes which may have tended to draw it towards the part last affected. That peculiar state of constitution, in which the body upon the receipt of very slight injuries is disposed to pour forth blood in unusual quantities, must be treated upon general therapeutical principles, and with careful attention to the condition of the blood itself.

When describing the characters and general symptoms accompanying *active* hæmorrhages, we stated that they may be regarded as the natural remedy to the conditions which give rise to them, and that they generally cease after the discharge of a certain quantity of blood. If, therefore, the quantity effused be moderate, we should not be over solicitous to arrest the flow of blood, unless it be discharged from some organ, whose functions may afterwards be impaired by the presence of the effused blood. If a hæmorrhage have commenced with active symptoms, and be so excessive as to induce great exhaustion, the blood must then be arrested as speedily as possible.

To attain this object, cool fresh air must be allowed to circulate freely around the patient, and he must be kept in a state of quietude. All muscular exertions, as well as mental emotions, all kinds of stimulating food and drink, in short, every thing which is known to have the power of exciting the heart's action, should be carefully avoided; and that posture of the body should be recommended, which is the least favourable to the afflux of the blood towards the part affected. Thus, the horizontal posture will be most desirable when the hæmor-

rhage is from the lower parts of the body; and the erect, when it comes from the upper parts.

Of the actual remedies to be employed for checking profuse active hæmorrhage, the most important and the most powerful is venesection. The effects attained through artificial bloodletting by venesection are, diminution of the force of the heart's contractions, abstraction of the general plethora, removal of local congestions, and diversion of the current of blood from the suffering organ. The method, the amount, and the repetition of the bloodletting, will be regulated by the circumstances of the case.

Other means of diminishing the vascular plethora, which so commonly attends active hæmorrhage, may be resorted to, as purgatives and diuretics. Indeed, the former class of remedies act most powerfully and beneficially as derivatives, both in the active and passive forms of the disease. Astringents are also a powerful class of remedies in hæmorrhage; but it is principally in the passive forms that they are most useful. Cold acts as an astringent, and is extremely useful in stanching the flow of blood. It may be brought into immediate contact with the bleeding surface, as when ice is swallowed to restrain hæmatemesis; or cold water injected into the rectum in hæmorrhois, or into the vagina in uterine hæmorrhage. The cold may be applied near to, but not immediately in contact with the bleeding surface; as to the skin of the nose and forehead in epistaxis, to different parts of the abdomen in hæmorrhage from the alimentary canal, to the perinæum or groins when blood escapes from the uterus or bladder. The flow of blood is restrained by a sympathetic action on the blood-vessels of distant parts, as when epistaxis is suddenly stopped by the application of cold to the back or the genital organs, or the catamenia by wet feet.

When a profuse active hæmorrhage has been arrested by the above-mentioned remedies, it is the duty of the practitioner to recommend the adoption of such measures as may prevent a recurrence. The patient should carefully avoid those circumstances which induce general plethora, and not less so those causes which promote afflux of blood towards the part, whence the discharge has taken place. If the organ is likely to suffer from the presence of the effused blood, an attempt should be made to establish a permanent derivation of the circulation towards some other part from which hæmorrhage is not attended with serious consequences; and should the premonitory symptoms of hæmorrhage from that same organ again appear, it is better, with the hope of preventing such an accident, to draw off a quantity of blood by venesection.

In the treatment of *passive* hæmorrhages the object should be, first, to arrest them as soon as possible; secondly, to remove the state of constitution on which they depend. The aggravation of constitutional distress which ensues after each successive passive hæmorrhage, requires that the flow of blood be, if practicable, immediately arrested. Here venesection is inadmissible in the great majority of cases, although the skilful practitioner may occasionally resort to it to arrest internal passive hæmorrhage. When the situation of the parts permits of it, the different methods of compressing the bleeding surface may be attempted. The application of cold is often very efficacious. The best internal remedies to control passive hæmorrhage, are those substances which are called tonics and astringents. Some of these are vegetable, others mineral productions. The vegetable substances employed are chiefly those into the composition of which the gallic acid enters. Such are preparations from gall-nuts, catechu, kino, oak bark, and rhatany root; infusion of red roses, sulphate of quinine, and oil of turpentine, are also much used. The mineral substances, which are supposed to possess a styptic property when administered internally, are the acetate of lead, the mineral acids, particularly the sulphuric, alum, sulphate of copper and zinc, nitrate of potash, and the tincture of the sesquichloride of iron. The choice of these numerous remedies will depend upon the judgment of the practitioner; some of them are more particularly applicable to hæmorrhages from certain

parts, and these will be pointed out when the individual hæmorrhages are considered.

The second indication to be fulfilled in the treatment of passive constitutional hæmorrhages, is to improve the state of health on which they depend. For this purpose we must enjoin careful rules of diet; the patient should breathe a bracing air, enjoy constant exercise in the country, avoid all mental or bodily fatigue; and where we have reason to apprehend a deterioration of the blood, the cautious and long-continued use of preparations of iron will often be attended with the best effects.

Symptomatic and sympathetic hæmorrhages. In the preceding part of this article we have described the pathology and general plan of treatment of spontaneous hæmorrhages resulting from constitutional disturbance; we must now briefly advert to those other hæmorrhages which we have termed symptomatic and sympathetic, depending upon serious changes of structure in different organs.

We have already directed attention to the pathological fact, that a sudden hæmorrhage sometimes appears to constitute a whole disease; it is the only morbid phenomenon that we can detect; such is the case when it occurs as a symptom of constitutional disturbance, as epistaxis or menorrhagia. At other times, a hæmorrhage forms the principal sign and earliest indication of local lesion of structure: it is then truly symptomatic. Lastly, hæmorrhage from a part is sometimes only an accidental symptom of obstructed circulation through it, the obstacle being situated elsewhere; we have called this last form of hæmorrhage, sympathetic.

Symptomatic hæmorrhage. The local lesions of structure, which most frequently give rise to this form of hæmorrhage, are, 1, inflammatory congestions of parts; 2, the changes of structure induced by inflammation, as the induration, softening, and ulceration of tissues; 3, the developement of new and morbid growths in organs, as tubercles, carcinoma, &c.

1. Hæmorrhage, as a consequence of inflammation of a tissue, is by no means uncommon; it happens both at the early and later stages of that process. The congestion of the blood-vessels of a part is the first visible phenomenon of inflammation; when this is established, blood will sometimes escape from the part in the form of hæmorrhage, and immediately the congestion and other local signs of inflammation disappear. At other times the escape of blood from the vessels, instead of cutting short the inflammation, only causes increased embarrassment to the affected part. This happens when the effused blood remains pent up, and cannot make its way by any natural outlet from the body.

2. In the more advanced stages of inflammation, when softening or induration of the affected tissue has taken place, any sudden afflux of blood to such altered structure may be immediately followed by hæmorrhage. If the inflamed tissue have gone into a state of ulceration, the coats of some blood-vessel may be eroded; and this lesion gives rise to the most formidable and incurable attack of hæmorrhage.

3. Andral, Louis, and many other pathologists are of opinion, that copious hæmorrhage is one of the earliest symptoms indicating the developement of morbid deposits in organs: thus, hæmoptysis is one of the earliest symptoms of the developement of tubercles in the lungs; and when carcinoma attacks the stomach or the uterus, hæmorrhage from those organs is a very common and early symptom. The hæmorrhages to which the foregoing observations apply, may be strictly termed symptomatic; they depend upon lesions of structure in the parts whence they occur, and are independent of pathological conditions of other organs.

Sympathetic hæmorrhages. There are other hæmorrhages depending upon local lesions of structure, which we have thought right to distinguish by the title of sympathetic. In these the flow of blood takes place in consequence of some structural lesion in other organs than that from which the blood actually es-

capes. The part in which the hæmorrhage occurs, sympathises with some other part, the two having some intelligible connexion or relation to each other through the vessels of their circulation. Thus, valvular disease of the left side of the heart occasions obstruction to the pulmonary circulation, and hæmorrhage takes place into the lungs. Again, atrophy or induration of the liver obstructs the free circulation through the portal vein, and hæmorrhage from the mucous membrane of the intestine is the consequence. These are instances of what we term sympathetic hæmorrhage.

The numerous symptomatic and sympathetic hæmorrhages are not accompanied by any uniform train of symptoms, such as characterize active and passive constitutional hæmorrhages. They are rather preceded and accompanied by symptoms referrible to the organ, the structural lesion of which occasions the hæmorrhage. Thus, in a symptomatic hæmorrhage the escape of the blood is preceded and accompanied by symptoms strictly belonging to the organ whence the blood flows, as in hæmoptysis from tubercles in the lungs, in hæmatemesis from ulceration of the stomach, in hæmaturia from renal calculus. On the other hand, in sympathetic hæmorrhage the escape of blood is long preceded by symptoms of disordered function of that organ, which causes the embarrassment of the circulation, rather than of the organ whence the hæmorrhage takes place; as in hæmoptysis from diseased heart, in hæmatemesis from enlarged spleen, in intestinal hæmorrhage from diseased liver. Attention to this part of the history of a case of hæmorrhage will materially assist the practitioner in making a correct diagnosis.

The treatment of these symptomatic and sympathetic hæmorrhages consists in the judicious application of remedies suited to the lesions of structure of the different organs which give rise to such hæmorrhages.

Hæmorrhages considered with reference to their seat. Hæmorrhages may be regarded, with referance either to the anatomical characters of the tissue whence the blood flows, as the mucous or serous membranes, for example, or to the organ whence that fluid escapes, as from the lungs, stomach, uterus, &c. The former arrangement appears the more philosophical, and has been preferred by able writers, as Chomel (*Dict. de Méd.* vol. ii.), and has been recently adopted by Dr. Copland (*Dict. of Med.*).

In our own opinion we shall better preserve brevity and afford a more comprehensive view of the subject by treating of hæmorrhages as they occur from the different tissues. At an early part of this article we stated the pathological fact, that there is scarcely a structure of the body which may not suffer from the spontaneous effusions of blood in its vessels. This accident occurs in the parenchyma of organs, in the cellular tissue, in the substance of the skin as well as from its free surface, from serous membranes, and especially from mucous membranes.

Hæmorrhage into the substance of organs. Blood is occasionally found infiltrated through the structure of an organ: its extravasation is more frequently the result of some disease in the tissue in which it is found, or it may occur from great disturbance of the circulation through the organ, however that may be produced. The same accident may be occasioned by great external violence over the seat of the organ.

Blood is not uncommonly found extravasated from such causes into the substance of the brain, lungs, liver, kidneys, testicles, and other viscera. These hæmorrhages are more appropriately considered with the special diseases of these several organs. They are most of them instances of the symptomatic and sympathetic forms of hæmorrhage.

Cutaneous hæmorrhage. Hæmorrhage from the vessels of the skin presents itself under two forms : In the first, there is an exudation of blood from the free surface of the cuticle ; in the other, the blood is extravasated into the substance of the skin itself. The former of these cutaneous hæmorrhages is of very rare occurrence ; when it does happen, the escape of blood is generally

confined to a limited portion of the surface, though sometimes the exudation is much more extensive. Whenever blood is thus poured forth from the free surface of the skin, the appearance of this remarkable phenomenon may generally be traced to some cause operating on the constitution generally, and not to any structural lesion of the skin itself. When the cutaneous hæmorrhage is local, it takes place most commonly from the face, the front of the chest, the mamma, the armpit, the navel, the groin, the hand, or the foot. All these parts have occasionally been known to be the seat of this kind of hæmorrhage.

These circumscribed transudations of blood from the skin have occurred at all ages, and in both sexes, but far more frequently in the female. We have met with two cases of this description in females, but have known of one only in men. These rare forms of hæmorrhage are met with chiefly in chlorotic girls, and they are generally of that character which have been termed vicarious, the bleeding taking the place of some other habitual hæmorrhage.

The first case of this kind which came under the writer's treatment, was in the person of a girl about eighteen, of fair skin and sandy hair, labouring under aggravated symptoms of chlorosis, with œdema of the lower extremities, and suppressed menstruation. In this girl, an oozing of watery blood took place around the nail of one of the great toes; it appeared several times, continued for a week or ten days, but did not assume the regularity of menstruation.

The other case occurred in a middle-aged plethoric woman, who was troubled with a nearly constant oozing of a dark red fluid from the nipple of one breast, so that her shift was constantly stained by it. On pressure around the nipple, several drops of this dark bloody fluid could be obtained; it resembled a dark menstrual secretion more than real blood. The catamenia were not suppressed, but more scanty than might have been expected from so robust a woman.

Dr. Watson has accurately described the phenomena which are usually observed in these cases. The surface of the skin becomes covered, in the part affected, by a dew of blood; if this be wiped away, no unnatural appearance of the skin is perceptible, but the blood presently exudes afresh. Although no alteration of texture can be seen, sometimes the colour of the skin of the part undergoes some modification. In a case related by Dr. Whytt, the hæmorrhage took place from the extremity of the middle finger of the left hand, and was preceded and accompanied by a spot of redness, and by slight pain. Analogous phenomena were observed in the case of a Lombardy peasant, who had occasionally considerable hæmorrhage from the extremity of one thumb. The facts of this case were communicated to the writer when a student at the University of Pavia, by Bartolomeo Panizza, the Professor of Anatomy.

It has already been stated, that these various bleedings, from a limited portion of the surface of the body, are generally vicarious of some other habitual hæmorrhage; they are usually of short duration, and cease when the habitual discharge of blood is re-established. In some cases, however, the cutaneous hæmorrhage is obstinate, and even assumes the regular periodicity of menstruation, of which it is vicarious. Examples of periodical cutaneous hæmorrhage are also recorded to have taken place in men. Dr. Watson quotes a case from Mayer, where hæmorrhage from the skin of the arm recurred every spring time; this exudation of blood was then capable of being induced by the mere contraction of the muscles of the part. Cutaneous hæmorrhage is sometimes more extensive, and assumes the appearance of a general bloody perspiration. Such cases have been observed to occur under the influence of some powerful mental emotion, or excessive bodily exertion. Many authors have doubted the existence of such cases; but history, both sacred and profane, has put on record instances of this rare and singular phenomenon.

Charles the Ninth, King of France, is recorded to have exhibited this phenomenon during the last moments of his life. The blood is described as having

oozed out all over his skin. Dr. Copland has detailed a remarkable instance of exudation of blood from the skin of a horse. An Arabian horse upon most occasions of exertion was covered with a bloody sweat, which became nearly pure blood upon great exertion. It was general, and unattended by any other sign of disease. (*Dict. of Med*).

When the exudation of blood from the surface of the body is limited in extent, there is little danger, as it is generally vicarious of some suppressed natural discharge; the treatment consequently consists in endeavouring to restore that discharge. Those cases of bloody perspiration which have been attended to, are of a too rare occurrence to make their treatment a subject of especial consideration. Such a phenomenon occurring in the human being would always be regarded with alarm, and as indicative of some powerful impression on the nervous system.

The second form of cutaneous hæmorrhage is that where the blood is not poured out on the free surface of the skin, but exudes into its substance, or between the cutis and cuticle, or into the subcutaneous cellular tissue.

When the blood is found extravasated in either of the two former situations, it is generally in small circular spots, varying in size from a pin's head to a split pea. These spots are generally very numerous: sometimes they are confined to a particular part of the body, as the abdomen or extremities; at other times they may be observed thickly sprinkled all over the trunk and limbs. When very minute, they are usually described as petechiæ, and are frequently found in the course of continued fevers of a peculiar type. When they are larger and numerous, they constitute the principal symptoms of that remarkable disease called Purpura. When the blood is extravasated spontaneously into the subcutaneous cellular tissue, it is generally in considerable quantities; in such cases there is usually a similar effusion into the substance of the skin itself. The portions of the skin where this hæmorrhage occurs have a livid colour, and these livid patches or blotches are often found at many points in the same case. This variety of cutaneous hæmorrhage is met with in scorbutus and severe cases of purpura.

These various forms of hæmorrhage from the cutaneous vessels seldom proceed to any extent, without the co-existence of hæmorrhage from other tissues. Not only do exhalations of blood take place from the different mucous membranes during life, but when such cases terminate fatally, we find ecchymosis or purpurous spots in the mucous membranes of the mouth, fauces, stomach, and intestines; in the serous membranes of the lungs, heart, brain, and abdominal organs; in the substance of the muscles; in the neurilema of the large nerves; in the periosteum of the long bones; and sometimes in the parenchyma of the large organs.

Willan, Bateman, Rayer, and others, who have published systematic treatises on the diseases of the skin, have described many of these varieties of cutaneous hæmorrhage as diseases of the skin itself. The preceding pathological facts prove that this is too limited a view of the nature of such affections, and that the cutaneous hæmorrhage is only one of many indications of a serious constitutional affection.

Dr. Watson has taken this view of the nature of those cases which are characterized by extravasations of blood beneath the cuticle and into the substance of the skin. He has also given an interesting account of the various hypotheses which have been offered to explain the simultaneous hæmorrhages in the same individual. (*Med Gaz.*, vol. x., p. 498.) Some have ascribed them to an increased action of the heart and arteries, overcoming the natural resistance of the extreme vessels in their healthy state, an opinion which is quite untenable, 1st, because these hæmorrhages from the cutaneous vessels more frequently co-exist with an opposite state of the circulation, with a feeble action and diminished force in the heart and arteries; and, 2dly, because in cases where the impetus of the

circulation reaches its highest pitch, as in certain inflammations, these purpurous spots on so many different tissues do not appear.

Again, the hæmorrhage has been attributed to a want of tone, to an unnatural degree of passive dilatation of the extreme vessels themselves, so that they allow a passage to the red blood, which, so long as they are in a healthy condition, they refuse to admit. Against this hypothesis we have the negative presumption, that supposing the channels of the hæmorrhage to be those outlets which we call exhalants, no evidence is furnished of their extraordinary patency by any excessive escape of their proper fluids, which might be expected if this hypothesis were true.

Another supposition is, that the coats of the minute vessels themselves somehow or other lose their consistence, become tender and fragile, and unable to sustain the ordinary impetus of the healthy blood. This notion carries with it at first sight a greater degree of probability than the last, for it is concordant with the well-known fact, that in many cases of purpura slight pressure upon the skin is soon followed by the appearance of a bruise, or by actual ecchymosis, a consequence it might seem of the breaking down of the fine vascular texture of the part upon which the pressure was made. But of all the solutions that have been offered with the view of accounting for the escape of the blood from its containing vessels in purpura, that appears to be the most simple, and the most probable, which ascribes it to some morbid alteration in the blood itself. This supposition is not inconsistent with any of the observed phenomena of the disease, and it seems the only one which is capable of explaining them all; and (what is strongly confirmatory of its truth) the blood in many, perhaps in all instances of the disease, in which it can be examined, is found actually to have undergone a change, and not merely a change which may be ascertained by nice or elaborate chemical research, but such an alteration of its sensible qualities as is evident to the eye, and forces itself upon our notice.

There are some persons who think that with this change in the composition of the blood, there is combined a diminution of resistance in the coats of the minute blood-vessels; that these two circumstances often co-exist; and that the one has been the cause of the other. It is highly probable that such a pathological condition of the blood and its capillary vessels may co-exist in these cases; but which is cause, and which is effect, it appears at present impossible to decide.

However we may attempt to explain the process by which the blood escapes from the cutaneous vessels, it is certain that in all those cases which are characterized by extensive sanguineous effusions, as in scorbutus, purpura, malignant small-pox, and petechial fevers, the entire mass of the blood undergoes sensible alterations.

These cases of hæmorrhage into the substance of the skin and into the subcutaneous cellular tissue are to be regarded as examples of passive constitutional hæmorrhage, and to be treated upon those general principles which have been already explained.

Hæmorrhage from serous membranes. Exhalations of blood from serous membranes are of rare occurrence when compared with their frequency from mucous membranes. When blood is found extravasated into the sac of a serous membrane, it is very seldom that it can be ascribed to constitutional causes; it almost invariably has been occasioned by some diseased state of the membrane itself, such as active inflammation, or by the laceration of a blood-vessel from external violence, or the bursting of an aneurism. The only instances of hæmorrhage from the vessels of serous membranes, which can be ascribed to constitutional causes, are those passive exhalations into the subserous cellular tissue, which are observed in aggravated cases of scorbutus and purpura.

When hæmorrhage into any of the serous cavities takes place in consequence of the rupture of an aneurism or the laceration of a blood-vessel from external

violence, if the individual do not sink rapidly, a train of symptoms arise analo-
gous to those which are always observed upon the loss of any considerable
quantity of blood.   Syncope may or may not occur according to the amount of
blood effused.   Symptoms of compression of the organ or organs, which are
invested by the serous membrane, are next manifested.   Lastly, the effused
blood, like any other foreign substance, becomes a source of irritation to the
serous membrane, and the symptoms of inflammation of that membrane are
developed.   The subsequent course of the case will depend upon the seat of
the extravasation, its amount, and the degree of inflammation that may super-
vene.

The blood which has been effused into serous membranes sometimes under-
goes remarkable modifications.   These are better observed in hæmorrhages
into the peritoneum or pleura, than bloody effusions into the pericardium or
arachnoid, because the organs, invested by the former membranes, can to a
certain extent tolerate the pressure occasioned by the extravasated blood ;
while the functions of the heart and brain are sooner or later annihilated by
such compression.   If the blood has escaped from an aneurismal sac, or from
the wound of some large vessel, the hæmorrhage is generally so great that the
person quickly sinks, and the effused blood is found merely separated into
crassamentum and serum, there not having been time for any further change to
take place.   But if the quantity extravasated be more moderate, and the person
have survived the hæmorrhage for some days or weeks, the effused blood will
be found coagulated.   This acts as a foreign body, and excites a certain
degree of inflammation around it, which usually terminates in the effusion of
coagulable lymph.   If the inflammation be confined to this stage, the mass of
coagulated blood is found enveloped by a false membrane, enclosed as it were
in a pouch.   These false membranes are developed with great rapidity around
masses of extravasated blood, both when it is effused into serous cavities and
into the substance of organs, and appear to be formed for important purposes.
They circumscribe for example the coagulum, and limit the extent of its irrita-
tion ; they confine it to one situation, and thus prevent it from subsequently
becoming a source of irritation to other parts ; they likewise probably present a
surface admirably calculated to act by absorption upon the foreign body.   This
latter function of the new membrane is particularly manifested after cerebral
hæmorrhage.   A cyst is formed around the clot, which after a certain time is
entirely absorbed.   The same train of phenomena is occasionally observed after
hæmorrhage into a cavity lined by a serous membrane.

When the extravasated blood excites inflammation of the serous membrane,
it may not be limited to the surrounding parts and to the exudation of coagulable
lymph, but proceed to more extensive lesions under which the person ultimately
sinks.

If the quantity of blood effused be small, and it be not gradually absorbed, it
may become organized, increased in bulk, and at length converted into a new
structure.   This physiological fact was first made known by John Hunter, then
corroborated by Abernethy, and has subsequently been confirmed by the obser-
vations of Andral, Carswell, and the author.   (*Med. Gaz.* vol. xvi. ; *Croon.
Lect.* 1835.)   In Mr. Abernethy's "Attempt to form a Classification of Tu-
mours according to their Anatomical Structure," he states that John Hunter,
upon opening the cavity of the abdomen, once discovered lying on the perito-
neum a small portion of red blood recently coagulated.   This, upon examina-
tion, was found connected to the surface upon which it had been deposited by
an attachment half an inch long ; and this neck had been formed before the
coagulum had lost its red colour.   "Now," says Mr. Hunter, "had vessels
shot through this slender neck, and organized the clot of blood, as this would
then have become a living part, it might have grown to an indefinite magnitude,
and its nature and progress would probably have depended on the organization
which it had assumed."   "I have in my possession," writes Mr. Abernethy,

" a tumour, doubtless formed in the manner Mr. Hunter has described, which hung pendulous from the front of the peritoneum, and in which the organization and consequent actions have been so far completed, that the body of the tumour has become a lump of fat, whilst the neck is merely of a fibrous and vascular texture."

Thus, then, blood effused into serous cavities may excite inflammation, or it may be gradually absorbed in the manner described, or it may become organized and transformed into a new structure.

Hæmorrhage from the serous membrane of the brain or spinal cord. The effusion of blood from these membranes is almost invariably occasioned by the laceration of vessels from external violence, or disease of the vessels themselves. Under either circumstances, the symptoms of pressure on the nervous centres are immediately manifested, and a more or less extended paralysis is the consequence. This paralysis may gradually disappear, and complete recovery take place, or the usual symptoms of irritation of the membranes of the brain and spinal cord may supervene ; or death may ensue ; and then the various changes in and around the effused blood, which have been described, are discovered upon dissection. The symptoms and pathology of this lesion will be found detailed under DISEASES OF THE BRAIN AND SPINAL CORD.

Hæmorrhage from the pleura. This may occur from the bursting of an aneurismal tumour into the pleural cavity ; from the erosion of a large blood-vessel by ulceration ; from the laceration by external violence of some of the large vessels within the chest, or laceration of the parenchyma of the lung. More rarely the extravasation of blood may be the consequence of active inflammation of the pleura itself.

When hæmorrhage into the pleura arises from the rupture of a blood-vessel, however it may have been occasioned, if the effusion of a large quantity of blood is not followed by fatal syncope, the symptoms of compression of the lung are quickly manifested by an increasing and distressing dyspnœa. This is soon succeeded by more unequivocal signs of inflammation of the pleura, which sooner or later leads to a fatal termination. After death, besides the usual appearances found in pleurisy, the changes in and around the effused blood already described, are discovered. When hæmorrhage takes place into the pleura, in consequence of active inflammation of this membrane, it constitutes what has been termed *hæmorrhagic pleurisy.* This affection is generally fatal. On dissection the blood is found intimately mixed with the serous effusion ; more rarely it is found partly fluid, and partly coagulated.

Andral has recorded two very interesting cases of this latter description. In both instances the pleurisy came on very gradually and lasted many weeks before the fatal termination. Each case was characterized by complete remission of the severer symptoms, and by fatal relapses. Upon dissection a considerable quantity of pure blood, partly liquid and partly coagulated, was found covering the inflamed pleura. No peculiar symptom accompanied these attacks, which could have indicated the nature of the effusion. (*Clin. Méd.*, vol. ii., obs. 15 and 16.) It is probable that, in these and similar cases, the blood is effused only a short time prior to the fatal termination, and perhaps in the following manner :—Upon the fresh accessions of inflammation, the newly organized and highly vascular false membranes, which are formed at the earlier part of the attack, become intensely congested. The newly formed vessels are ruptured by the sudden distension of their coats, and pure blood escapes into the cavity of the pleura. This explanation is rendered probable by the ascertained fact, that the inner layers only of the false membrane are stained by the blood, while those immediately in contact with the pleura retain their usual consistence and colour.

Hæmorrhage into the pericardium. When blood is found extravasated into the pericardium, its source may generally be traced to the rupture of an aneurism of the aorta : the hæmorrhage may also proceed from one of the cavities

of the heart, in consequence of the penetration of its walls by some sharp-pointed instrument.

Dr. Baillie in his *Morbid Anatomy* says, " Cases have occurred, though very rarely, in which a large quantity of blood has been accumulated in the cavity of the pericardium, but where no rupture could be discovered after the most diligent search, either in the heart itself, or in any of its vessels. This appears very wonderful, and not at all what any person would expect *à priori*. Two conjectures have occurred to me, to explain this phenomenon : first, that the blood-vessels on the surface of the heart have lost their compactness of tissue, so that the blood may have escaped by transudation. The other is, that the blood may have been poured out by the extremities of the small vessels, from their orifices having been to a very uncommon degree relaxed." Dr. Baillie refers to two cases of extravasation of blood into the cavity of the pericardium, in which the source of the blood could not, after the most careful examination, be discovered ; and Dr. Carson has also detailed the particulars of a remarkably interesting case of this description. (*Med. Chir. Rev.* 1834.)

We have also met with a case of this kind in a man who was brought into St. Bartholomew's Hospital, faint and exhausted, and who quickly expired. A large quantity of blood was found in the pericardium, but a very careful scrutiny did not detect whence the blood had escaped.

It is probable that in such cases the blood escapes by a sort of passive exhalation from the surfaces of the pericardium ; but it must be admitted, that the pathology of these rare cases is not well understood. The symptoms during life are those occasioned by loss of blood, combined with great precordial distress, and the physical signs of fluid in the pericardium.

Hæmorrhage into the pericardium occasionally arises from intense inflammation of that membrane. Dr. Latham once found upon dissection the cavity of the pericardium filled with pure and unmixed blood, and its surface entirely lined with coagulable lymph, of which that portion which covered the heart itself was as red as the gills of a fish, and from its numerous lineal elevations not unlike them in other respects. The hæmorrhage, for such it really was, was considered to be owing to a secondary inflammation of the adventitious membrane. He offers the following explanation of the appearance of the blood in the sac of the pericardium, and which has already been suggested in describing hæmorrhage into the pleura : When the fluid effused into the pericardium (after inflammation) has a tinge of blood, it denotes an inflammatory action still continued in, or imparted afresh to, the newly formed and newly organized coagulable lymph. Newly formed and newly organized structures are very apt to pour forth blood upon any considerable excitement ; and under these circumstances are found loaded with blood-vessels. (*Med. Gaz.*, vol. iii.)

But hæmorrhage into the pericardium, the consequence of severe inflammation of that membrane, is more particularly likely to occur in a scorbutic constitution. Dr. Seidlitz, the senior physician of the Naval Hospital at St. Petersburg, published a memoir on a peculiar kind of pericarditis, attended with copious exudation of blood into the sac. (*Brit. and For. Med. Rev.* vol. i. p. 289.)

In 1831 several sailors died suddenly at St. Petersburg, whilst engaged at work ; others who were admitted into the hospital lived only for a short period. On the examination of their bodies it appeared that their death was owing to a severe inflammation of the pericardium joined to a copious exudation of a sanguineous fluid into the pericardial sac. On Dr. Seidlitz communicating these facts, and exhibiting some of the diseased hearts to his colleagues, Dr. Crichton remarked, that the disease had been one of frequent occurrence amongst the troops. In February, 1832, the disorder appeared to have assumed an epidemic character. It is remarkable that the complaint was only to be met with between the months of February and September ; the period during which scorbutic forms of disease commonly prevail at St. Petersburg ; and it was usually associated with a transitory epidemic of a rheumatic nature. It is therefore probable

that this singular malady was in reality rheumatic pericarditis occurring in scorbutic constitutions. All these cases exhibited during life well marked symptoms of pericarditis terminating in effusion of fluid, but no peculiar symptom indicated the nature of the effusion. Some of these cases were complicated with pleurisy, which had also terminated in sanguineous effusion : the cause of the escape of the blood in these cases was probably not that which has been suggested in explaining the extravasation of blood in common pericarditis and pleurisy ; but it here arose from the scorbutic diathesis.

Hæmorrhage into the peritoneal cavity. The extravasation of blood into the sac of the peritoneum is rarely met with excepting upon the rupture of some large vessel in the abdomen. This accident may happen from the bursting of an aneurismal sac ; from the laceration of some vessel by external violence ; from the laceration of some viscus, as the liver, spleen, kidney, or intestines, by a blow or fall or other mechanical injury, or from the rupture of the ovary or Fallopian tube in extra-uterine pregnancy. The symptoms occasioned by such extravasation, and the effects which ensue, are precisely similar to those described when treating of hæmorrhage into the pleura. The abdominal organs are more tolerant of the presence of the effused blood than the thoracic, and death does not so constantly result from this accident. Blood is also found extravasated into the peritoneum in some cases of peritonitis, particularly in that form of the disease which comes on after a repetition of the operation of paracentesis. The observations which were offered in explanation of the escape of blood in pleuritis are equally applicable to cases of peritonitis accompanied by extravasation of blood.

Hæmorrhages from mucous membranes. We have already entered very fully into the pathology of hæmorrhages from mucous membranes. It is unnecessary, therefore, to dilate upon this subject. The mucous membranes afford the most frequent and remarkable examples of constitutional hæmorrhages, both active and passive, as well as vicarious. Symptomatic and sympathetic hæmorrhages likewise occur from these membranes. And as the respiratory, alimentary, urinary, and genital organs, are traversed by canals lined with mucous membranes, so do the hæmorrhages from these surfaces constitute an important series, which we shall proceed to describe as so many separate diseases.

CONNEXION OF INFLAMMATION AND HÆMORRHAGE.

THE doctrine of hæmorrhage is attended with many difficulties which cannot be thoroughly removed in the present state of our science ; these depend mainly upon the close connexion between it and inflammation. They may be in a great degree diminished by considering active hæmorrhage under three different aspects, as connected with a particular state of the vessels of the whole body or of the organ affected, with local inflammation, and as merely symptomatic. These various causes of hæmorrhage are more frequently found in combination than separate; thus, a local cause is at times sufficient to produce it, but it is much more liable to do so if connected with a general hæmorrhagic tendency. Vicarious hæmorrhage is governed by its own peculiar laws, and sympathetic hæmorrhage hardly occurs except in an individual in whom the constitutional tendency is highly developed, and in most respects it should be regarded as dependant upon the general predisposition.

The hæmorrhagic tendency is rendered obvious to our senses only by the condition of the capillary vessels ; these are generally, in persons subject to hæmorrhage, highly developed, and of a bright arterial red colour. These individuals are generally of the sanguine temperament, and the ruddiness of the complexion is a good indication of the great activity of the circulation ; besides the capillaries in them become full of blood upon slight emotions or muscular efforts ; but although these individuals are disposed to hæmorrhage, it does not often

actually occur unless some local cause should be called into activity. Notwithstanding we
are obliged to regard the hæmorrhagic diathesis, in most cases, as a modification of the san-
guine temperament, it is not necessarily so, and it would be more correct to say that the par-
ticular state of the vascular system which disposes to hæmorrhage is in most cases connected
with the sanguine temperament, but not invariably. If an individual be of this temperament,
and the rapidity of the circulation of the blood be very great; that is, if great mobility, or
rapidity of the capillary circulation exist, we may safely assume that such an individual is
prone to hæmorrhage, and that an attack of this kind is in him of less significance and of less
danger than in another individual who does not offer these peculiarities. When the tendency
to hæmorrhage is very evident in an individual who does not present the signs of the sanguine
temperament, it probably depends upon an altered condition of vessels, and less consistent
with healthy developement than the tendency to hæmorrhage dependent mainly upon tem-
perament; it is in itself a diseased state, and in many cases proves to be but the prelude to
organic lesions. Let a local disorder take place, and this connexion between organic disease
and hæmorrhage becomes still more clearly apparent. It is not necessary, however, that the
organic lesion should actually exist at the time of the effusion of blood; this is in itself merely
a probable evidence of the diseased action which terminates in the morbid structure; but the
material product of this action may not yet be formed. We cannot accurately define this
condition of the vessels, but we recognise it by its effects; and it may be legitimately assumed
as an established fact.

It is very clear that the difference between inflammation and hæmorrhage depends upon
the constitutional causes which are much developed in the former case and very slight in the
latter; but there are marked differences in the local changes which occur in the two states:
in inflammation the blood becomes fixed and stagnant in the part—in hæmorrhage it oozes
out, and inflammation does not often follow except a portion of blood accidentally remain in
the tissues; not that the two disorders, hæmorrhage and inflammation, may not co-exist in
the same tissue; but this would merely prove that a mixed action is going on, which gives
rise to totally different phenomena. In active hæmorrhage we find the tint of the part and
the consistence of the tissue are very different from inflammation; there is very little indura-
tion or friability, and the blood may be in a great degree washed out from the part; we there-
fore infer that there is no local reaction—no attempt at organization of the effused blood.

There is, besides, a condition of the blood which is very different in the two disorders: in
inflammation we have, as is well known, a large proportion of fibrin contained in this fluid,
but in hæmorrhage this is not the case; the blood is of a lighter red colour than usual, and
seems to be highly arterialized, but not peculiarly rich in fibrin. So that the two states
are different, not merely in the local signs which arise from the changes of the part itself, but
in the condition of the general circulatory system; and we have great reason to believe that
although hæmorrhage often occurs as a new and accidental disorder, yet that it is in a nu-
merous class of cases connected with a peculiarity of constitution bordering closely on dis-
ease.   G.

HÆMORRHAGE FROM THE NOSE, OR EPISTAXIS.

Symptomatic of constitutional and local disease.—Active.—Passive.—Vicarious.—Treatment.

EPISTAXIS (derived from επι *super*, σταζω *stillo*), signifies a flowing of blood
from one or both nostrils. Bleeding from the nostrils is so conspicuous a phe-
nomenon, that it can rarely take place without exciting observation. The
blood may, however, escape from the posterior aperture of the nostrils into the
pharynx, and be thence rejected through the mouth, and is then liable to be
mistaken for hæmoptysis. At other times the blood received into the pharynx
is unconsciously swallowed, occasionally exciting nausea and vomiting, and

stimulating hæmatemesis, with the suspicion of disease of some of the chylo-poietic viscera.

When blood flows from the external opening of the nostrils, we can gene-rally ascertain that the seat of the hæmorrhage is the Schneiderian membrane. Epistaxis is certainly one of the most frequent and most harmless of hæmor-rhages, occurring at all ages, from early childhood up to advanced old age ; it happens to the most robust as well as the most delicate, and is most frequently a symptom of a particular state of the constitution ; hence all that has been ad-vanced in discussing constitutional hæmorrhages, both as to the mode of escape of the blood, their pathology and treatment, applies in the great majority of cases of epistaxis.   There may, however, exist particular lesions of the Schneiderian membrane and parts adjacent, which give rise to epistaxis.   Like every other hæmorrhage which is entitled to be regarded as a symptom of constitutional dis-turbance, so do we find epistaxis associated with very opposite conditions of the system.   Sometimes it must be regarded as an active, at other times as a pas-sive, hæmorrhage ; and all that has been stated, when describing these forms of hæmorrhage, applies to epistaxis.

Epistaxis, as an active hæmorrhage, is observed in robust and plethoric habits, most commonly in the interval between puberty and old age : it is met with more frequently in men than women.   The quantity of blood lost upon these occasions varies from a few drops to several pints ; in the earlier periods of life the loss of blood is generally attended with great relief to the constitu-tional and local symptoms ; but when this discharge is continued through the advanced periods of life, although the present relief may be as great as at earlier periods, still there is more reason to comprehend danger from the continued ten-dency to cerebral congestion.

In those who are constitutionally predisposed to active hæmorrhages, many causes tend to bring on epistaxis ; thus, slight injuries about the nose ; violent exercise ; sudden increase of temperature of the atmosphere ; powerful emotions of mind ; continued study : stimulating food ; irritation of the sensitive nerves of the nostrils by snuff, ammonia, or other volatile stimulants, which may cause sneezing ; fits of coughing ; depending position of the head ; wearing a tight cravat, or waistband, &c.   But epistaxis often happens when we cannot trace it to the operation of any of these exciting causes : the individual is made aware of its approach by various premonitory symptoms : sometimes a sense of fulness, heat, tingling or itching, within the nostrils, or weight over the brow ; pain in the forehead ; headache ; heat of head ; giddiness ; noise in the ears, or some morbid state of vision, are felt.   The flow of blood appears and continues for a certain time, with considerable relief to the local symptoms.   The hæmorrhage at last ceases, but is easily removed if the person does not adopt precautions to keep the circulation quiet for some time afterwards.

Epistaxis is likewise met with as a passive hæmorrhage ; in this form it occurs most frequently in delicate children and young persons about the age of puberty, and sometimes to a most alarming extent : it also happens in persons of all ages, labouring under cachexia : it is an occasional symptom in fevers, particularly in those forms accompanied with typhoid phenomena, and in those diseases where it is known that the blood is greatly deteriorated, as in scorbutus and purpura.   When epistaxis occurs as a passive hæmorrhage, it is not usually preceded by any marked premonitory symptoms ; the blood suddenly pours forth from the nostrils, in large quantities, without any assignable exciting cause ; and in young children of delicate constitutions, in the upper classes of society, it may induce dangerous and almost fatal syncope before the hæmorrhage can be arrested.   When it occurs in the cachectic the flow of blood is seldom so rapid, but the oozing often continues for a longer time, sometimes for several days in succession.   In either case we may remark an aggravation of constitutional depression, and an increased tendency to a repetition of this unfavourable symptom.   The quantity of blood lost by this

form of epistaxis is generally considerable, often to the extent of many pounds; and cases are recorded, where the amount lost is hardly credible.

Epistaxis sometimes appears as a vicarious hæmorrhage, as, for example, upon the suppression of the catamenia or hæmorrhoidal flux, and continues as long as either of them is suspended. Indeed, epistaxis is not often met with in the female, after the period of puberty, unless the menstrual discharge is scanty, or accidentally suppressed.

Epistaxis, like other hæmorrhages, may be the consequence of a morbid condition of the bleeding part; thus, the Schneiderian membrane may be preternaturally delicate, vascular and sensitive, so that very slight injuries, as the insertion of the finger into the nostril, blowing the nose, or sneezing, may rupture that membrane, and induce a considerable flow of blood. Inflammation of this membrane in common catarrh, or in that which accompanies some of the eruptive fevers, may give rise to epistaxis; or the presence of polypi in the nostrils, or disease of some of the bones of the nose, may excite undue vascularity of these parts, and give rise to epistaxis.

Treatment. When bleeding from the nostrils occurs with those symptoms which indicate it to be a constitutional hæmorrhage of either the active or passive form, it must be treated on the principles which have already been pointed out, when constitutional hæmorrhages were fully considered.

In those cases, where it is thought advisable to restrain the flow of blood, an erect posture, the application of cold about the head, nose, and neck, with pressure on the bleeding surface, will be found the most effectual means of controlling the hæmorrhage. Pressure may be accomplished in two ways. Direct compression may be made by passing a long piece of catgut, or other convenient flexible director, from the anterior aperture of the nostrils, whence the hæmorrhage issues, so far into the pharynx, that, by the aid of a pair of forceps, its extremity may be drawn into the mouth. To this director, a piece of cotton or lint is to be attached, of sufficient thickness to press against the walls of the nostrils, when it is retracted from the pharynx; this being done, the director is to be separated from the lint or cotton, which is allowed to remain in the nostril, until further means shall have the effect of suppressing the hæmorrhagic tendency. Such is the method generally recommended by surgical writers: but the irritation excited, when an attempt is made to put it in practice, and, when effected, the aversion expressed by patients to its endurance, are so great, that whatever the danger may be, they will rarely submit to it, or suffer its continuance for a sufficient length of time; and it must be acknowledged, that there is some hazard that its removal may prove a fresh cause of excitement. (*Cyc. of Prac. Med.* art. EPISTAXIS.) A great surgical authority (Mr. Abernethy) used to tell his pupils with his accustomed humour, that he knew that such a method could be adopted, for he had seen it done; but whenever he had tried to do it, he always failed, finding an obstacle in the excessive irritation produced in the muscles of the pharynx; but the same eminent surgeon has observed, that he had never seen an instance of epistaxis, which could not be suppressed (and he had seen a great many instances) by the introduction of a cylindrical plug of lint through the anterior nares, made sufficiently large to fill the tubular part of the nostril, being first wetted and wound round a probe, so as to give it the form of a bougie, long enough to allow it to be passed along the floor of the nose, from the anterior to the posterior aperture, but not into the throat, the probe being withdrawn when the lint has thus been disposed of. This plug should be allowed to remain in three or four days, while the proper means are taken to remove the causes of the hæmorrhage.

When this method of compression is very unpleasant to the patient, or when it cannot be effectually accomplished, some cooling and astringent fluid may be injected into the nostrils; either vinegar and water, the diluted solution of the acetate of lead, a weak solution of alum, sulphate of zinc or copper. Sometimes a very finely levigated astringent powder blown into the nostrils through

a quill, or other small tube, will cause the blood to coagulate, and thus arrest the hæmorrhage. Powdered alum, powder of galls, and similar substances have been employed for this purpose; but unfortunately their presence sometimes excites sneezing and considerable irritation of the Schneiderian membrane, thus displacing the coagulum, and the hæmorrhage is renewed.

An instance of the successful use of the powder of gum acacia blown into the nostril in a case of epistaxis, which had continued for two days, and had resisted the other means generally adopted, has been reported in the *Medical Repository*, vol. xxvii., extracted from *Hufeland's Journal*. As this substance is not only free from the objection we have mentioned to astringent powders, but congenial to the sensibility of the Schneiderian membrane, and probably produces its good effects simply by increasing the tenacity and the adhesive quality of the blood on its issue from the bleeding surface, it may in some cases be an eligible application. The arrest of the hæmorrhage may often be accelerated by resorting to the use of those remedies which act by revulsion; thus, hot stimulating pediluvia, mustard cataplasms to the calves of the legs or soles of the feet, or a powerful stimulating purgative, as a large dose of oil of turpentine, will be found useful. Purgatives, indeed, are most efficacious in controlling epistaxis, whether of the active or passive forms.

The principles which are to guide the practitioner in his attempts to prevent the return of constitutional hæmorrhages from the nostrils, have already been explained. In those cases of passive epistaxis occurring in delicate children and young persons of precocious intellect, great advantage will be derived from shaving the head, or keeping the hair cut close; from a residence at the seaside, and bathing in the open sea; from cold shower baths, and cold bathing of the head and neck every morning; from gentle exercise in an open carriage, and from those various remedies which conduce to strengthen the constitution. When epistaxis is vicarious of menstruation, or of the hæmorrhoidal flux, it is desirable to resort to those methods of restoring the natural or habitual discharges, which have already been recommended.

When this form of hæmorrhage frequently recurs, in consequence of the delicacy of the Schneiderian membrane, it is advisable to protect it by anointing it daily with some simple ointment. If this membrane, or its subjacent bones be inflamed, the application of leeches externally about the nose, or at the entrance of the nostrils, will often prevent a recurrence of epistaxis. If a polypus, or other cause of irritation, exist within either nostril, exciting congestion and nasal hæmorrhage, it should be removed by surgical operation without delay.

HÆMORRHAGE FROM THE LUNGS, OR HÆMOPTYSIS.

Definition.—General description.—Sources from which the blood may issue.—Pulmonary lesions induced by hæmoptysis.—Pulmonary apoplexy.—Causes of hæmoptysis.—Active constitutional hæmoptysis—its symptoms and treatment.—Passive constitutional hæmoptysis and its treatment.—Vicarious hæmoptysis and its treatment.—Hæmoptysis induced by pulmonary diseases, symptoms and treatment—by cardiac diseases, symptoms and treatment.—Hæmoptysis resulting from obstruction in the abdominal circulation.

THIS word, derived from αιμα, blood, and πτυσις, spitting, strictly signifies the rejection of blood from the mouth, without reference to the source whence it may be derived, whether it pass upwards through the trachea and larynx, or through the œsophagus and pharynx, or be simply poured forth from the membrane of the mouth itself; but in the present day, pathologists are in the

habit of employing it, in a restricted sense, to signify the expectoration of blood from the lungs and air-tubes.

It is then necessary to bear in mind, in every case where blood is rejected from the mouth, that its source may be either from the mucous membrane of the mouth itself, from the pharynx, from the stomach, from the larynx, trachea, and bronchial tubes, or from the vesicular structure of the lungs; but under the term *Hæmoptysis* are comprised hæmorrhages from the respiratory organs only.

The respiratory organs are peculiarly predisposed to hæmorrhage, which will not appear surprising, when it is recollected how extensive a surface the mucous membrane of the bronchial tubes offers for exhalation, and how abundantly the lungs are supplied with blood; so that any cause which obstructs the free passage of the blood through the minuter branches of the pulmonary vessels, readily produces extreme congestion of the lungs, exhalation of blood, and untimely hæmoptysis. Although the extravasation of blood, in any quantity within the bronchi or vesicles of the lungs, is almost sure to be succeeded by hæmoptysis, still this symptom is by no means constantly present, when smaller quantities are extravasated into the minuter structure of the lungs; as in that form of pulmonary hæmorrhage, called *pulmonary apoplexy*.

It would thus appear that hæmoptysis is an insufficient term to designate every form of hæmorrhage from the respiratory tubes; but as it is consecrated by long usage, it has been thought better here to point out this objection to its universal application to hæmorrhages from the air-tubes, rather than introduce any new word of doubtful acceptation.

Although no period of life can be regarded as exempt from hæmorrhage from the respiratory organs, still it is certain that hæmoptysis occurs most frequently in the interval between the ages of fifteen and thirty-five—the period when tubercular phthisis manifests itself, and active congestion of the lungs giving rise to exhalations of blood may be expected. But the aged and the infant are by no means exempt from pulmonary hæmorrhage. When it occurs in the former, it is most commonly connected with disease of the heart; and M. Billard has pointed out the existence of pulmonary apoplexy in infants only a few days old. We have also, upon two or three occasions, detected the existence of this form of pulmonary hæmorrhage in the bodies of infants at the Hôpital des Enfans trouvés at Paris. It is also probable that pulmonary hæmorrhage may occur much oftener in children than pathologists suppose, as children invariably swallow the expectorated secretions.

It has been stated that the blood in hæmoptysis may arise from other sources than the respiratory organs. It is not uncommon to meet with individuals who, having observed streaks or spots of blood intermixed with their saliva, imagine that they have been attacked by hæmoptysis. It is generally easy to discover whether or not the blood comes from the mouth itself, by an attentive examination of the different parts of that cavity; besides, the blood is generally scanty in quantity, of a scarlet colour, quite fluid, and unmixed with air, which may generally be observed in that which comes from the respiratory tubes. The escape of blood from the posterior opening of the nostrils into the pharynx, and afterwards into the mouth, may be distinguished from that which passes upwards from the lungs. When the hæmorrhage is abundant, blood is sure to escape also from the anterior opening of the nostrils, and thus there is little doubt as to its origin; when the quantity is small, and flows backwards only, after resting some time on the velum palati, it is rejected from the mouth dark, coagulated, and unmixed with air; besides, shortly before or after this kind of spitting of blood, the mucus which comes from the nostrils will be observed to be tinged. The blood, which is rejected by hæmoptysis, varies much in quantity in its physical characters, and in the length of time it may continue to flow.

The quantity of blood lost by hæmoptysis is sometimes so great, amounting in some instances to several pints, that it is surprising a fatal result is not im-

mediately produced : nevertheless, cases occur where similar quantities are lost several times, and it is not until long afterwards that incurable disorganization of the lungs manifest itself; and indeed, in some rare cases, the individual after the cessation of the hæmoptysis continues in the enjoyment of good health. (Andral, *Clin. Med.*, vol. ii., p. 179.)   At other times the quantity is less considerable ; the person expectorates a mouthful every now and then, after which hæmorrhage entirely disappears : it is, however, to be regarded with alarm, as an index of deep-seated and incurable mischief in the lungs.   Lastly, the expectorated mucus may be merely tinged, or streaks of blood may be seen mixed with it ; in either case, serious lesions of the heart or lungs may be suspected. From the foregoing observations it is clear, that the quantity of blood lost by hæmoptysis is no index of the extent of thoracic disease, nor of the degree of danger in any particular case.   It is desirable that the physical characters of expectorated blood should be known, as this knowledge sometimes assists the practitioner in forming a diagnosis, whence the blood has been poured forth. If the quantity be very large, it is generally of a bright scarlet colour, mostly fluid, although some coagula are generally observed mixed with it, and the upper surface of the ejected blood received into a basin appears frothy.   When the blood is brought up in smaller quantities, as a mouthful at a time, it is generally of a bright colour, partly fluid and partly coagulated, but mixed with few or no bubbles of air : when the quantity of pure blood is still less, and is expectorated by coughing, it is generally coagulated, rather dark, and moulded into the form of the bronchial tubes.   When the hæmoptysis consists in the expectoration of mucus more or less intimately imbued with blood, it is generally of a very florid red, minute air bubbles are disseminated through it, and the secretion is viscid.   In such cases we may predict that the blood is exhaled from the minuter ramifications of the bronchi, or from the air vesicles themselves.   The appearances of the expectorated blood will however vary, depending a good deal upon the length of time it has remained in the bronchi before it has been expectorated, and still more upon the time which has elapsed from the actual hæmoptysis, and the period when the blood is presented for inspection.   It is evident, therefore, that much caution is requisite in judging upon the physical characters of the blood, although in some cases they may render great assistance in forming the diagnosis of the source of the hæmorrhage.

The duration of an attack of hæmoptysis is also liable to considerable variation : some individuals are suddenly seized with a profuse discharge of blood, which gradually subsides and entirely disappears in the course of twelve or twenty-four hours.   Others expectorate a smaller quantity of blood every morning for several days successively ; the hæmoptysis subsides and recurs in a similar manner after some weeks or months.   Where the quantity expectorated daily is small, or where the hæmoptysis consists in the expectoration of blood intimately blended with mucus, the attack may last for one or two weeks, then cease, and again recur in a similar manner.   The cessation may be the result of the treatment adopted, and the recurrence may be traced to some imprudence on the part of the patient ; but the greater number of individuals who are attacked with hæmoptysis, have a recurrence of it.   It is very rare that in a first attack, however alarming, the hæmorrhage proves fatal ; when death follows such an accident, it may be, as in the case of any other hæmorrhage, from exhaustion by syncope, or the quantity of blood poured forth may so obstruct the bronchial tubes as to produce asphyxia.

The sources from which the blood may issue in hæmoptysis (according to the definition of the term we have given), appear to be the three following :—1. The larynx and trachea ; 2. The bronchial tubes ; 3. The vesicular structure of the lungs.

Hæmoptysis, arising from laryngeal or tracheal hæmorrhage, is of very rare occurrence ; when it does happen, the blood may escape by exhalation from the lining membrane as in other parts, or from the mucous membrane, in conse-

quence of ulceration exposing some subjacent vessel, or from the rupture of an aneurismal sac into the larynx or trachea. Chomel, óne of the most able writers on hæmorrhage, has stated that laryngeal and tracheal hæmoptysis have been admitted rather from analogy, than established by any precise observations. " It has been thought," he adds, " that in those cases where patients have rejected a few frothy bloody sputa, preceded by tickling and heat in the larynx or trachea, and without dyspnœa, or other distressing sensations within the chest, it was rational to suppose the hæmorrhage took place from these parts of the respiratory organs; and it has been also thought, that if after such an hæmoptysis no symptoms of phthisis have supervened, this circumstance tended to confirm the opinion that the blood was not exhaled from the bronchial tubes. We can only admit this variety with doubt and reservation." (*Dict. de. Med.* art. HÆMOPTYSIS.) If a scanty exhalation of blood do sometimes take place from the larynx and trachea, it will be in those persons whose professions require a violent and prolonged exercise of the vocal organs; such as singers, actors, and public speakers. That hæmoptysis may sometimes, however, take place in consequence of ulceration in these parts, there is no doubt; an interesting example has been published by Dr. Watson. (*Med. Gaz.* vol. iii., p. 156.)

Hæmoptysis may also arise from the rupture of an aneurismal sac into the larynx or trachea; in such cases, previous to the occurrence of the hæmoptysis, unequivocal signs of this lesion, and all the distressing symptoms of continued pressure on the larynx or trachea, are observed. It appears needless to advert further to this source of hæmoptysis, because the hæmorrhage is so sudden and copious, that death almost immediately follows.

The bronchial tubes are by far the most frequent source of hæmoptysis, and the mode in which the blood escapes is by exhalation. Formerly, when it was generally believed that hæmoptysis only arose from a ruptured blood-vessel in the lungs, cases of recovery from hæmoptysis must have excited great surprise; but repeated observations have recently shown, that in many individuals who have died from profuse hæmoptysis, there is no physical lesion in the lungs beyond the presence of tubercles in different stages of developement. The mucous membrane in these cases presents no other appearances than are observed in simple bronchitis; indeed, sometimes the bronchial membrane is found pale or only slightly stained. Andral has recorded a case of fatal hæmoptysis, where the parenchyma of the lungs was perfectly healthy, where no tubercles were present, and where a simple exhalation of blood from the bronchial mucous membrane appeared to be the sole cause of death.

When blood is thus poured out into the bronchial tubes, it gives rise to many distressing symptoms:—Aggravated dyspnœa, a sense of a fluid bubbling or gurgling in the chest, which excites cough, and thus accomplishes the expulsion of the blood from the bronchi. When the blood is poured forth rapidly and abundantly into the bronchial tubes, it necessarily causes great obstruction to respiration. The person suffers great distress and a sense of impending suffocation; all the auxiliary muscles of expiration are called into action; they contract spasmodically; the lungs are forcibly compressed in every direction; and the blood is expelled from the bronchi into the trachea, larynx, pharynx, and mouth, whence, as well as from the nostrils, it escapes in jets. The irritation of the blood in the pharynx excites nausea and vomiting; so that upon examination the rejected blood is found mixed with the contents of the stomach, and thus often arises some difficulty in forming a diagnosis between hæmoptysis and hæmatemesis: this difficulty, however, is considerably lessened by the physical signs of disorganization of the lungs being readily detected by auscultation. Other distinguishing signs will be enumerated when the subject of hæmatemesis is considered.

When blood is exhaled into the bronchi in smaller quantity, it often excites but little irritation, and escapes readily through the larynx into the mouth, hardly producing cough. When, however, the extravasated blood is more or less

intimately blended with mucus, it generally produces more irritation, and is often expectorated by coughing with considerable effort.

When the extravasation of blood takes place from the smaller bronchial tubes, it sometimes happens that the blood stagnates and coagulates in them; and the consequence is, that some of the lobules of the lungs have a dark brown or black colour. Andral states his belief, that this is the most common origin of that peculiar lesion of the lungs, which has been designated pulmonary apoplexy by Laennec. In such cases there are found at various parts of the lungs several hard dark masses, more or less exactly circumscribed. They are found almost exclusively, he thinks, in individuals who have died during hæmoptysis; nevertheless, he found similar lesions in the lungs of those who have never had hæmoptysis. He is far from regarding the situation of these apoplectic effusions as the only parts whence the hæmorrhage has taken place: they are but accidental lesions, which depend upon the stagnation and coagulation of the effused blood in some of the smaller bronchial tubes, the hæmorrhage which gives rise to the hæmoptysis taking its origin from a much more extended surface of the mucous membrane. (*Anat. Path.*, vol. iii., p. 488). This view of the mode in which these collections of blood are formed in some few lobules of the lungs, is very similar to that adopted by Dr. Watson, who thinks it probable that the seat of the effusion is (sometimes at least) in the larger branches of the air-tubes, and that the blood is forced into certain of the pulmonary lobules by the convulsive efforts to respire; and that they thus become so completely crammed with blood, as to preclude any subsequent admission of air, and to present the appearances of pulmonary apoplexy. (*Med. Gaz.*, vol. ix., p. 656.)

The observations of Andral, and the interesting cases of hæmorrhage from an ulcerated lingual artery, recorded by Dr. Watson, prove that, when the blood is effused into the bronchial tubes, it may gravitate and coagulate in the vesicular structure, giving rise to those hard dark masses which are commonly described as pulmonary apoplexy. But the writer has, for many years, directed his attention to this pathological condition of the lungs; and although his field of observation has been extensive, still he has never been able to meet with a case of pulmonary apoplexy, where he could satisfy himself that this particular lesion was produced in the manner described by Dr. Watson. In the numerous cases of pulmonary apoplexy which have fallen under his observation, the blood has appeared to have been extravasated where it is found coagulated; and so far from the majority of such individuals having died from hæmoptysis, as remarked by Andral, many have not had that symptom at all, or only in a very slight degree.

Another but rare form of bronchial hæmorrhage arises from the ulceration, of the mucous membrane and perforation of the coats of some subjacent pulmonary blood-vessel. Dr. Carswell has recorded and delineated a case of this kind, where scrofulous ulceration made its way through a large bronchus, and perforated a contiguous branch of the pulmonary artery. Through this direct communication the blood escaped so abundantly, that the case proved fatal in less than a quarter of an hour. The sac of an aneurism of the thoracic aorta will sometimes compress and cause the absorption of the walls of a bronchial tube; at length the blood bursts into the bronchus, and the profuse hæmoptysis proves rapidly fatal.

The source of the hæmorrhage in hæmoptysis may be the vesicular structure of the lungs. A sanguineous exhalation into the pulmonary parenchyma is much more frequent than is generally supposed; and, no doubt, many persons die with this lesion of the lungs without its having been suspected, because it is not always accompanied by hæmoptysis. This kind of pulmonary hæmorrhage has not been so long known to pathologists as the former: it was first accurately described by Laennec, under the name of Pulmonary Apoplexy. The extravasated blood is found coagulated, blocking up the vesicular structure of a certain number of lobules of the lungs: these masses are hard, dark, and generally

circumscribed : their section presents a dark granular surface, almost like a piece of damson cheese : upon scraping the surface the blood is removed, and the parenchyma of the lungs becomes very visible ; sometimes the surrounding tissue is unaffected ; at other times fluid blood is found in the adjoining smaller ramifications of the bronchi. Sometimes the extravasated blood is not confined to the smaller bronchi and the air-cells of certain lobules ; but these latter are ruptured ; the blood then escapes into the interlobular cellular tissue ; the parenchyma of the lung is broken down by the extravasated blood, which collects in clots in a cavity hollowed out of the substance of the lung. This, says Andral, is a true pulmonary apoplexy, very different from the former, where the blood is merely extravasated and coagulated in the bronchi and air-cells ; in this latter lesion the pulmonary tissue is actually lacerated by the effused blood, just as the medullary substance is in cerebral apoplexy. (*Op. cit.*, vol. iii., p. 511.) The extravasation is sometimes so considerable, that the structure of one lobe or more of a lung may be almost obliterated and reduced to a sort of pulp, consisting of liquid and coagulated blood. The extravasated blood may not only lacerate the substance of the lung, but also the pleura, into the sac of which it escapes in considerable quantities. Andral has recorded an instance of this kind, where a phthisical patient was seized with aggravated dyspnœa, bloody sputa, with the physical signs of pleurisy of the left side. After death the lower lobe of the left lung was found lacerated by the extravasation of blood, which had made its way into the pleura, and excited pleurisy. (*Clin. Med.*, vol. ii., p. 167.) When the pulmonary apoplexy is of small extent, it is not followed by immediate death : the individual may survive days and weeks. M. Bouillaud has recorded a case where a mass of pulmonary apoplexy was surrounded by a well organised cyst, of which the internal surface was probably destined to accomplish the absorption of the extravasated blood. (*Arch. de Méd.*, Nov. 1826.) It would seem that, in this case, the same series of processes was about to be performed around this mass of extravasated blood, as pathologists have so often observed taking place after cerebral apoplexy.

Causes. The causes of hæmorrhage from the respiratory organs are sometimes general and constitutional ; in other cases purely local and physical. Constitutional hæmoptysis is in some instances of an active, in others of a passive nature ; or it may be merely vicarious of other natural or habitual hæmorrhages. Hæmoptysis from local causes sometimes arises from physical lesions of the substance of the lungs themselves, or is connected with diseases of other important organs, especially of the heart, and occasionally of the larger abdominal viscera.

Hæmoptysis, appearing as an active constitutional hæmorrhage, independent of any discoverable alteration of texture, either in the mucous membrane of the bronchial tubes, or in any other part capable of influencing the capillary circulation of that membrane, is certainly of very rare occurrence. Those who have paid most attention to this subject have met with but few instances of it. It would seem that, whenever the constitution is in a state favourable to hæmorrhage, an effort is made to get rid of the superabundant circulating fluid through some other medium, as the nostrils, the stomach, intestines, or uterus. Although the presence of effused blood of the bronchial tubes is productive of alarming symptoms, and is so often followed by fatal results, nevertheless in those cases of vicarious menstruation through the lungs, the effused blood is expectorated again and again without permanent injury of their parenchyma. Chomel states, that a good many persons are to be met with who have had one or two attacks of hæmoptysis in the course of their lives, but who have notwithstanding reached an advanced age. (*Dict. de Méd.* art. HÆMOPTYSIS.) Andral also admits the occasional occurrence of constitutional hæmoptysis, and states that, in some individuals, it is not accompanied by more serious symptoms than a simple epistaxis. (*Clin. Med.*, vol. ii. p. 178.) Though the existence of hæmoptysis as an active constitutional hæmorrhage is established by recorded

cases, we are still disposed to think that, in the greater number of supposed instances of spontaneous constitutional hæmoptysis, there exists a latent physical lesion, which will sooner or later manifest itself by more certain symptoms.

When this form of hæmoptysis does occur, the constitution of the individuals corresponds with the description given of those predisposed to active hæmorrhages, while the general symptoms do not materially differ from those observed in similar hæmorrhages from other parts. Those local symptoms which have been enumerated as preceding active hæmorrhages, will be observed in reference to the lungs. A sensation of dyspnœa, constriction across the chest, more or less pain, or sense of heat beneath the sternum, or irritation in the trachea or bronchial tubes, generally precede the expectoration of florid blood. The presence of the extravasated blood in the bronchial tubes produces an aggravation of dyspnœa, exciting frequent cough, a sense of gurgling or ebullition, being, at the same time, felt in the chest, resulting from the passage of the inspired and expired air through the fluid blood in the bronchi. Auscultation generally detects the existence of that peculiar sound, technically called large crepitation, in various parts of the chest. These local symptoms continue until all the extravasated blood is expectorated.

When hæmoptysis occurs as an active hæmorrhage, the further exhalation of blood is arrested, both by the effect of actual loss of blood on the heart's action, and also by the shock to the nervous system, from the alarm of the patient upon viewing the gush of blood from the mouth, the hæmoptysis thus relieving the peculiar state of constitution on which it depends.

Treatment. As we have endeavoured to show that hæmoptysis is to be regarded as a symptom of different pathological condition of the whole system, or of particular parts, it is evident that it requires great modifications in its treatment. On this account it will be preferable to point out the treatment applicable to each form of hæmoptysis after describing its history. Although every active hæmorrhage may, to a certain extent, be regarded as a salutary effort of nature, and as tending to promote its own cure, still the extravasation of blood into the bronchial tubes is accompanied with such urgent symptoms, that the practitioner, upon its first appearance, is naturally most anxious to arrest further hæmorrhage. The plan of treatment, already recommended for active hæmorrhages in general, may be adopted in cases of hæmoptysis of an active character. After the hæmorrhage is arrested, too much caution cannot be adopted in exercising the organs of respiration ; and it may be necessary to repress the tendency to plethora by repeated bloodlettings. For a considerable period after the cessation of the hæmorrhage, the greatest care is necessary on the part of the patient.

Passive constitutional hæmoptysis is of more rare occurrence than the active form, and is only met with as a symptom in purpura, scorbutus, and perhaps some petechial fevers. The treatment principally consists in that adapted to the disease of which the hemoptysis is an accidental symptom. It is in this kind of passive hæmorrhage that bloodletting is sometimes desirable, as the loss of blood by venesection is a much less serious evil than its exhalation into the parenchyma of the lungs ; neither is it inconsistent with sound pathology to administer tonics and nutritious diet at the same time that we employ moderate depletion ; for, while we attempt to improve the supposed deteriorated quality of the blood, we also diminish the quantity of the circulating fluid, and thus repress the tendency to its escape from the vessels.

Hæmoptysis not unfrequently appears as a vicarious secretion, supplying the place of some suppressed periodical or habitual discharge. Thus in females, particularly among the lower classes, in whom disordered uterine functions are often long neglected, upon the suppression of the catamenia from cold or other cause, an occasional, and sometimes a periodical, hæmoptysis is observed. Perhaps, after the physical lesions of the lungs and heart, this is the most

common cause of hæmoptysis. In some cases of vicarious hæmoptysis, we find it anticipating the usual menstrual period, and ceasing when the natural flux is established. In other cases the hæmoptysis altogether supersedes the catamenia for a great length of time, and establishing itself into a function almost necessary to the health of the individual. More commonly, however, the periodical hæmoptysis is supplemental of deficient or arrested menstruation. In these cases the individual suffers all the usual symptoms of constitutional disturbance preceding natural menstruation, when, after a few days, instead of the catamenia, pulmonary hæmorrhage makes its appearance, by which a degree of uneasiness in the chest is relieved. This state of things may continue for several years with much less detriment to the lungs and to the general health than might be anticipated. The treatment of this form of hæmoptysis consists in the employment of those means which will strengthen the general health, and solicit the return of the menstrual discharge. They consist principally in the occasional application of a few leeches about the vulva or anus; the employment of pediluvia; the hip-bath, and the internal administration of emmenagogues. When hæmoptysis occurs as supplemental of an habitual hæmorrhoidal discharge, its consequences are much more prejudicial, than hæmoptysis vicarious of menstruation. Laennec supposed that the former was more likely to be productive of pulmonary apoplexy, while the latter was generally a simple bronchial hæmorrhage. This form of hæmoptysis is certainly a rare disorder, for out of 20,000 patients which have come under our observation, during the last four years, we have only met with one instance of it. This individual has long suffered from hæmorrhoids, and upon their suppression, he was attacked with hæmoptysis, which entirely disappeared on the return of the habitual discharge. In such cases the tendency to further hæmoptysis should be repressed by those means which have been recommended in the treatment of active constitutional hæmorrhages, and then every effort made to encourage a return of the hæmorrhoidal discharge. Occasional local depletion about the anus should be adopted, to supply the want of the accustomed discharge.

Hæmoptysis arising from local and physical causes may be symptomatic, or the result of pathological conditions of the lungs themselves, and which may be comprised under the two following heads :—1. The existence of tubercles in the lungs; 2. Inflammation of the bronchial tubes, or the parenchyma of the lungs.

Unquestionably the physical lesion with which hæmoptysis is most frequently associated, is the developement of tubercles in the lungs. This fact is admitted by the best pathologists of the present day; but they are not all agreed in regarding the tubercles as the cause of the hæmoptysis; on the contrary, some have supposed, that in certain cases the hæmorrhage from the lungs has been the cause of the appearance of the tubercles. Andral has been cited as supporting this view of the question; but it seems to us that this author's opinion has been misunderstood. Although he relates a case, where it appeared to him that the tubercles were altogether dependent on the extravasation of blood, still he informs us, that of persons who die of phthisis, one-half do not expectorate blood until the tubercles have given unequivocal proofs of their existence; and that another sixth never spit blood at all, throughout the whole course of the disease, while in one-third only does the hæmoptysis precede and appear to be the starting point of the developement of the tubercles. (*Clin. Med.*, vol. ii., p. 181.) Andral thus establishes, by the results of his own clinical observations, the very opposite opinion to that assigned to him by Dr. Law. (*Cyc. Pract. Med.* art. HÆMOPTYSIS.) Laennec is of opinion, that the formation of tubercles precedes the hæmoptysis; and though this may be the first symptom of disease which alarms the patient, and induces him to seek medical assistance, yet if the chest be examined before its appearance, the physical signs of the existence of tubercles in the lungs will be detected.

Andral considers that these affections are so constantly associated together, that of all those persons who at some period of their lives have had hæmoptysis, only one-fifth are exempt from the developement of tubercles in the lungs. The opinion of Louis on this point is still more strong. He states, that for the space of three years he inquired of every patient who came before him, whether they had ever suffered from hæmoptysis, and he found that none but phthisical patients replied in the affirmative, excepting a few who had suffered from violence to the thoracic organs, or women labouring under amenorrhœa. He therefore thinks, that at whatever period hæmoptysis may occur (with the exception of the above mentioned cases), it renders the existence of tubercles in the lungs highly probable. In only one-fifth of the cases of Louis, the hæmoptysis preceded the cough and expectoration, so that the exhalation of the blood is rather to be regarded as the result than the cause of the tubercular infiltration. (*Sur la Phthisie*, p. 193, 204.) We may, perhaps, ascribe the frequency of hæmoptysis, in the early stage of phthisis, to the obstruction of the pulmonary circulation, caused by the extensive developement of tubercles in the parenchyma of the lungs. This obstruction may give rise to the hæmorrhage in two ways; it may either compel an increased energy of the right ventricle, whereby the blood is thrown with undue force into the pulmonary vessels, and thus induce hæmorrhage, or, the tubercles obliterating a considerable portion of the pulmonary parenchyma, there is no longer a just proportion between the quantity of blood circulating through the lungs and the capillaries of those organs, and thus a relative plethora is induced, and escape of blood in the bronchial tubes is the consequence. This accident is much more likely to occur, when the developement of tubercles has been very rapid, and there has not been time for the heart to undergo that atrophy, so common in phthisis, nor for the quantity of the blood to have been reduced to the altered state of the system.

The next source of the blood in hæmoptysis is tubercular ulceration of the lungs. Those who are familiar with the disorganizing process in the lungs which ensues when tubercles soften, would reasonably expect that erosion of large vessels, and consequent hæmoptysis, would occur. Again, those who, having opened the bodies of persons dying with hæmoptysis, have found the tubercular cavities, as well as the bronchi leading to them, full of blood, might anticipate that the blood had escaped from some eroded blood-vessel; but the careful investigations of Laennec, Andral, and others, into the pathology of phthisis, have demonstrated the interesting fact, that the blood-vessels of the lungs generally escape the destructive process: that they become pressed against the walls of the vomica, and are gradually obliterated. Laennec states, that he never found a vessel of any consequence, included within the substance of these bands, traversing a vomica; and that Bayle had mentioned only one case in which fatal hæmoptysis ensued upon the rupture of a vessel that extended across a very large cavity. Andral states, that he never but once found the orifice of a ruptured vessel in fatal hæmoptysis, and that this vessel was contained in a band stretching across a cavity which had been ruptured. The orifice of the torn vessel was plugged up by a small pale coagulum, which was easily removed, and left the extremity of the vessel quite free and open. In every other instance of fatal hæmoptysis, Andral was unable to discover that the hæmorrhage was the consequence of a ruptured vessel. In the course of twelve years' nearly constant attendance in the medical wards of St. Bartholomew's Hospital, we have only once met with a case of hæmoptysis, where the open orifice of an ulcerated blood-vessel in a vomica was discovered in the lungs after death. Instead of pure blood in a vomica, there is often only some puriform fluid, more or less stained with blood. In both cases the effused blood is evidently in the great majority of cases the result of exhalation from the bronchi and the walls of the vomica, and not from a ruptured vessel. Since hæmoptysis is so frequently a symptom of the developement of tubercles in the lungs, it is necessary that the diagnosis between it and that which we have called

active constitutional hæmoptysis should, if possible, be established. In that form of constitutional hæmoptysis, which arises from general plethora, and that which attends upon the early stages of the developement of tubercles, the local and general physiological phenomena are so similar, that the diagnosis between them cannot be established upon such data. But the physical signs, elicited by auscultation and percussion, will generally distinguish those cases which depend upon the presence of tubercles in the lungs. It has been stated by Louis, that phthisical hæmoptysis is seldom preceded by heat, pain in the chest, or other symptoms of fever more striking than those present for some days previously. (*Op. cit.* p. 204). This assertion, however, is not corroborated by the observations of other inquirers; and ever since these remarks of Louis have come under our notice, we have inquired of many persons suffering from hæmoptysis, for the first, second, or third times, whether they have been sensible of any uneasy sensations previous to its appearance, and they have invariably replied in the affirmative. The only exceptions met with have been in robust men engaged in laborious occupations, who, it is well known, do not attend to those minor indications of approaching disease, which alarm persons in the higher classes of society. When hæmoptysis occurs at the more advanced stages of phthisis, the local and general physiological symptoms, as well as the physical signs of tubercles, which have existed for a longer or shorter time, render the diagnosis comparatively easy. The practitioner called to a case of hæmoptysis for the first time, might mistake the large crepitation from blood in the bronchi for that arising from softened tubercles.

The treatment of hæmoptysis, occurring as an early symptom of the developement of tubercles, will not essentially differ from that recommended when it results from general plethora : we must employ general bleeding until an impression is made upon the activity of the circulation, and the pulmonary hæmorrhage is arrested. Laennec has very justly remarked, that bleeding in such cases will not prevent the developement of tubercles, nor remove them when already formed in the lungs ; the abstraction of blood, therefore must be limited to the quantity sufficient to relieve the congestion of the vessels. Any loss of blood beyond this is a serious diminution of the patient's strength, and is more likely to accelerate the progress of phthisis. Abstraction of blood by venesection in these cases of hæmoptysis may generally be followed by local depletion near that portion of the lungs, which we suspect to be the seat of tubercles. The local symptoms of distress about the chest will greatly subside after the application of a few leeches or the cupping glasses.

The circulation should then be kept as tranquil as possible by perfect rest of body and mind, the reclined posture, a cool temperature, and abstinence from all stimulating food or drink. To avoid the necessity of further abstraction of blood, such remedies as digitalis, tartarized antimony, nitre, and saline purgatives may be prescribed. When hæmoptysis depends upon the presence of tubercles it is very seldom, even with the utmost care, that a recurrence can be prevented. The return may be procrastinated by judicious treatment, but at length some accident causes congestion of the pulmonary circulation, and a second attack of hæmoptysis ensues. The case now generally resolves itself into one of phthisis, and the treatment must be conducted with reference to that disease, and not simply to the accidental symptom of hæmoptysis. The slighter forms of hæmoptysis, which occur at the more advanced stages of phthisis, seldom require bloodletting; we must endeavour to repress it by acetate of lead, mineral acids, opium, digitalis, nitre, and counter-irritation.

Hæmoptysis may be the result of inflammation of the mucous membrane of the bronchi or the vesicular structure of the lungs. When the hæmorrhage takes place at an early stage of the inflammation, it is sometimes considerable ; but when it comes on at a more advanced stage, the quantity of blood effused is trifling, and generally mixed with expectoration. The appearance of mucus, streaked or stained with blood, is an index of the severity of the inflammation,

and this kind of rusty expectoration is almost pathognomonic of pneumonia. The treatment of hæmoptysis, resulting from these pathological states of the lungs, merges altogether into that which is necessary to control the inflammation. It is but an accidental symptom arising from the inflammatory congestion, and disappears when that is relieved.

The next form of hæmoptysis is of a most serious description, and is an instance of what has been termed sympathetic hæmorrhage resulting from physical lesions in other important organs. It may be safely asserted, that next to the existence of tubercles in the lungs, the most frequent cause of pulmonary hæmorrhage and hæmoptysis is to be found in structural diseases of the heart. Chomel states that in these cases of hæmoptysis the disease is commonly situated in the right chambers of the heart. (*Dict. de Méd.* art. HEMOPTYSIE.) This opinion was also maintained by Dr. Law. (*Cyc. Pract. Med.* art. HÆMOPTYSIS.) But we entirely coincide with Dr. Watson, who thinks these opinions " are not borne out either by reason or general experience." The alteration in the structure of the right cavities of the heart, which these authors have asserted to be the cause of pulmonary congestion, pulmonary apoplexy, and consequent hæmoptysis, is hypertrophy of the right ventricle,—a morbid condition which is comparatively rare on that side of the heart, and which, we believe, would not suffice for the production of hæmoptysis, even if it did exist. At least the most striking cases of hypertrophy of the right ventricle we have met with, have been in cases of extensive emphysema, and where there never had been any hæmoptysis. The immediate effect of any obstruction to the free flow of blood, through the right side of the heart, would be to gorge the liver and the branches of the vena porta, and to prevent the lungs receiving their due proportion ; whereas any physical alteration of the left side of the heart may impede the return of blood from the lungs, cause accumulation there in the form of congestion of the capillaries, and so dispose to pulmonary hæmorrhage. Upon this point of pathology Dr. Watson has made some judicious remarks which are worthy of attentive consideration. (*Med. Gaz.*, vol. ix. p. 156.)

Numerous cases corroborating the views of Dr. Watson may be found recorded in medical journals. Dr. J. A. Wilson was one of the first to point out the connexion between the contraction of the mitral orifice and that pulmonary hæmorrhage which produces pulmonary apoplexy and hæmoptysis.

There is, however, another and less common morbid condition of the left side of the heart, which may be the cause of pulmonary hæmorrhage, and that peculiar lesion termed apoplexy of the lungs ; it is a dilated state of the left auriculo-ventricular opening. We have twice lately met with patients, who were suffering under hæmoptysis, with the physical signs of extensive pulmonary apoplexy and obstruction of the circulation through the left side of the heart, and in whom during life we had suspected the existence of extreme contraction of the mitral orifice, but, upon examination of the body after death, there was found extreme dilatation of that orifice ; so that it was permanently patulous, and permitted the reflux of blood upon the lungs upon each contraction of an enlarged and hypertrophied left ventricle. We must therefore admit, that any lesion of the left side of the heart, which is capable of obstructing the circulation through it, may be the cause of pulmonary hæmorrhage.

The symptoms which accompany pulmonary hæmorrhage, depending upon disease of the heart, are of course combined of those which indicate disordered functions of both those important organs. There is most distressing dyspnœa, constant hacking cough, with expectoration of a more or less abundant tenacious mucus, deeply dyed or intimately blended with blood. It is seldom that the quantity of blood is so considerable as in phthisical hæmoptysis. Auscultation and percussion reveal the presence of fluid blood in the smaller bronchi of some portions of the lungs ; while other portions seem to be rendered quite impervious to the air. At the same time there are unequivocal signs, both physical and physiological, of structural lesions of the left side of the heart, which

usually have existed for a considerable length of time. It is obvious, that the treatment of this form of hæmoptysis can never be successfully pursued by the internal use of those remedies which are supposed to possess the specific property of arresting hæmorrhage. As long as the obstruction to the circulation through the left side of the heart is sufficiently great to produce remora of the blood in the lungs, so long will the pulmonary hæmorrhage continue. The treatment must therefore consist, in the first place, in relieving the oppressive congestion of the capillaries of the lungs, by local depletion, by the application of cupping glasses near to that spot where we suspect the pulmonary apoplexy is forming ; secondly, a return of this condition of the lungs may be obviated, by diminishing the quantity of blood by the occasional application of a few leeches over the region of the heart, and by the administration of saline purgatives and diuretics, particularly nitre, digitalis, bitartrate of potash. By such means, if the extravasation of blood into the lungs be not already considerable, the hæmoptysis may be arrested, and the individual rescued for a time from the destructive effects of the effused blood on the parenchyma of the lung.

The last form of hæmoptysis to which we shall direct attention, is another instance of what has been termed sympathetic hæmorrhage, viz., that which arises from obstruction of the circulation through the abdominal aorta and its branches, in consequence of distension and pressure caused by enlargement of some of the abdominal viscera. In the advanced stage of pregnancy the great distension is sometimes attended with hæmoptysis. The same accident may happen from pressure on the abdominal vessels in ascites or tympanitis. In all such cases, if the disease on which the distension of the abdomen depends cannot be removed, the treatment must consist in diminishing the quantity of the circulating fluid and keeping the action of the heart as tranquil as possible.

CONNEXION OF HÆMORRHAGE OF THE LUNGS WITH TUBERCLES.

THE connexion of hæmoptysis with tubercles in the lungs appears in three different ways: 1st, hæmoptysis takes place in individuals disposed to consumption, in whom no tubercles are yet formed ; 2d, in those actually labouring under the disease, but offering tubercles in the crude state only, varying in amount from a few scattered granulations to large masses of tuberculous matter ; 3d, after cavities are formed. In the latter case, hæmorrhage may take place from simple ulceration of the bands containing vessels which pass from one side of the cavity to the other ; and the hæmoptysis is then very profuse, and usually soon fatal.

When hæmoptysis occurs before tubercles are formed, the attack may depend altogether upon constitutional causes ; and although the blood is discharged from the lungs, these organs are not always actually at fault, and there is no other connexion between consumption and hæmoptysis except that there is one condition of vessels which disposes to both disorders. But as this condition does not necessarily give rise to consumption, although it predisposes to it, hæmoptysis may occur without the developement of tubercles in one individual, while in another, who is placed under similar circumstances, decided phthisis may follow. In some of these cases, the mere raptus of blood towards the lungs is the exciting cause of the tuberculous developement, as may be demonstrated by pathological observation. In those cases in which phthisis does not follow, the hæmorrhage is generally slight, or its mischievous effects are obviated by treatment, or favourable hygienic circumstances.

In our examination of the cases in which phthisis does not follow pulmonary hæmorrhage, we omit those in which the bleeding is produced by violent efforts, blows upon the chest, or disease of the heart. In some cases, however, of hæmoptysis following sudden muscular efforts, phthisis supervenes very quickly ; in many of these cases the patients are evidently

predisposed to the disease; in others the tuberculous deposit appears to depend upon the hæmorrhagic congestion.

When tubercles are formed in the lungs before the hæmoptysis occurs, the spitting of blood arises from the combined influence of the local irritation and congestion caused by the tubercles, and of the general cause to which I have already alluded. It generally recurs several times if it has once taken place; although many patients pass through all the stages of the disease without hæmorrhage. As the flow of blood relieves to a certain extent the local irritation, many symptoms, such as cough and uneasiness in the chest, are greatly diminished, and the patient is much more comfortable, unless the effused blood should prove to be a new cause of irritation. Hæmorrhagic cases of consumption are therefore amongst the most favourable varieties of the disease, and frequently last through a long life, or end in perfect recovery.

There are two classes of individuals, however, who may suffer from hæmoptysis, without the least tendency to consumption; these are women in whom the spitting of blood is merely a vicarious discharge, intended to supply the suppressed menstrual secretion, and patients labouring under decided disease of the heart. In the latter of these cases the blood is discharged from the mucous membrane of the bronchi, or from the vesicular structure of the lungs, and relieves the congestion which arises from the difficulty in the return of the blood from the lungs to the heart. Neither of these cases is dependent upon actual disease of the lungs, or on the vascular condition which predisposes to tuberculous deposit.   G.

HÆMORRHAGE FROM THE STOMACH, OR HÆMATEMESIS.

Etymology.—Symptoms.—Diagnosis.—Prognosis.—Duration.—Influence of age and sex.— Quantity of blood effused.—Its physical characters.—Condition of the stomach in hæmatemesis.—Causes.—Active constitutional hæmatemesis.—Symptoms and treatment.—Passive hæmatemesis and its treatment.—Vicarious hæmatemesis and its treatment.—Hæmatemesis induced by organic lesions—of the stomach—of other organs.

HÆMATEMESIS (derived from αιμα, blood, and εμεω, I vomit) literally signifies the vomiting of blood, and therefore has been very generally employed to designate hæmorrhage from the stomach. Dr. Watson, however, has remarked that vomiting of blood is by no means the invariable accompanying symptom of escape of blood into the stomach, and he therefore objects to the employment of this term hæmatemesis in its usual acceptation. Other modern writers have objected to the term on similar grounds, and have proposed to substitute for it the Greek compound, *gastrorrhagia*. But as equally strong arguments may be adduced against the acceptation of this term, especially that it conveys erroneous ideas of the pathology of gastric hæmorrhage, and no advantage being gained by the proposed substitution, we shall employ hæmatemesis to designate gastric hæmorrhage.

The symptoms which usually accompany gastric hæmorrhage may be thus described:—An individual, previously perhaps in apparent robust health, after some powerful mental emotion or bodily exertion, is suddenly seized with a sense of fulness of the stomach and sickness, when he speedily ejects by vomiting, much to his own surprise and alarm, a quantity of blood. Previous to the attack of hæmatemesis, various premonitory symptoms, indicating considerable functional disturbance of the digestive organs, are generally experienced; such as loss of appetite, indigestion, sense of fulness in the epigastrium, pains in the hypochondriac regions, and costive bowels, until at length the uneasiness at the epigastrium amounts to dull pain, accompanied by a sense of weight and distension, with distressing sickness; a general feeling of chilliness and coldness

of the extremities, giddiness, dimness of sight, and faintness are felt, when at last blood in a fluid or partly coagulated state is vomited. These symptoms, which precede and accompany the hæmatemesis, probably arise from very different causes. At first there is a feeling of uneasiness, from congestion of the vessels of the stomach; then arise the sense of weight, distension, and nausea, occasioned by the presence of the effused blood in the stomach; and, lastly, the symptoms of syncope from the actual loss of blood supervene. It is not until a quantity of blood is effused, sufficient to excite nausea or produce distension, that an effort to vomit is made.

After the actual hæmatemesis has ceased, many of these symptoms also subside, and the person remains greatly exhausted, and much alarmed lest the hæmorrhage should return. It is in this state of collapse, with a pallid face and cold skin, that the patient is usually found on the arrival of the practitioner.

When symptoms such as have been described present themselves, the diagnosis of *hæmatemesis* appears to be clear, but in practice it is often difficult and obscure, and only to be arrived at through presumptive evidence. In the first place, hæmorrhage may take place from the mucous membrane of the stomach, and no hæmatemesis ensue. This may happen, either when the quantity of blood extravasated is very small or very large. When blood escapes from the gastric vessels very slowly and in small quantities, it passes the pylorus, and becomes visible only in the alvine evacuations, in which, however, it may not always be recognised, in consequence of the changes it has undergone in its passage through the alimentary canal. But if a small quantity of this altered blood be detected in the stools, there is not only uncertainty from what part of the canal it has been effused, but there is little suspicion of its being effused from the stomach. On the other hand, the quantity of blood poured into the stomach may be very large, and the hæmorrhage very sudden; the individual sinks into fatal syncope, and no blood is vomited. A case of this description is alluded to by Dr. Watson. (*Med. Gaz.*, vol. x., p. 438.)

Whenever blood is vomited, some degree of caution in deciding upon the source of the hæmorrhage should be exercised. There are cases of bleeding from the nostrils, the fauces, or even lungs, in which the blood, collecting in the pharynx, provokes, from time to time, an involuntary action of deglutition, and gradually accumulating in the stomach, is at length ejected by vomiting. This may occur in epistaxis coming on during sleep, especially in young children. The blood which is vomited is often in considerable quantity and coagulated, so that, from its appearance, it is scarcely possible to conclude that it has proceeded from any other source than the stomach itself.

Hæmatemesis is one of the few complaints which may be successfully feigned by impostors, either for the sake of avoiding military or naval service, or with the intention of exciting the compassion of the charitable. Blood has sometimes been swallowed in considerable quantities by such persons, and then vomited in the presence of those whom they wish to deceive.

Diagnosis. There is only one disease which is likely to be confounded with hæmatemesis, and that is a very profuse hæmoptysis. In copious hæmoptysis, the blood issues from the mouth in gushes, as it does in hæmatemesis; its regurgitation into the pharynx, the tickling sensation it produces there, or the violence of the cough which frequently excites retching—these causes, acting singly or together, produce sometimes a convulsive contraction of the muscles of the thorax, followed not unfrequently by vomiting. On the other hand, in sudden and profuse hæmatemesis, the irritation of the blood passing over the epiglottis is very likely to provoke a violent fit of coughing.

In these cases, which are perplexing when we first approach them, and particularly so if the patient be of the lower class, we may nevertheless arrive at a correct diagnosis by a careful investigation of the symptoms that precede, accompany, and follow the hæmorrhage. The premonitory symptoms of hæma-

temesis, particularly in reference to the digestive organs, have already been described. This affection is also more frequently than hæmoptysis preceded by the symptoms of approaching syncope, because the quantity effused in gastric hæmorrhage is sometimes very considerable before the actual hæmatemesis, but not so in bronchial hæmorrhage. On the other hand, hæmoptysis is usually preceded by dyspnœa, cough, tickling in the throat, and a sensation of a bubbling fluid in the chest. Most commonly too, immediately before or after the hæmoptysis, there is expectoration of bloody sputa. Again, those who are conversant with the practice of auscultation and percussion, will find the physical signs of structural changes in the lungs, or of the presence of the effused blood within the bronchial tubes. The expulsion of blood in gastric hæmorrhage ceases shortly after the first full vomiting, and is succeeded by obscure pains in the abdomen ; but in hæmoptysis the hæmorrhage continues in smaller quantities, and is followed by increased dyspnœa and cough.

It has been stated by Chomel (*Dict. de Med.*, vol. x.) and other writers, that hæmatemesis is a rare form of hæmorrhage ; some have even asserted that hæmorrhage takes place less from the stomach, than from any of the mucous surfaces. There is no doubt, however, that hæmaturia is much more rarely met with, and that hæmatemesis is, in this metropolis, at least, by no means a rare disease.

Hæmatemesis, like other forms of hæmorrhage, is apt to recur; sometimes there is no recurrence, though more commonly it is reproduced by the same or other exciting causes. Though an alarming syncope may take place at the time of the hæmorrhage, death is very rarely the immediate consequence of hæmatemesis, even when the quantity of blood vomited is very large. Its frequent recurrence will necessarily weaken and undermine the constitution, more especially when it is dependent upon structural disease of some important organ. Far more danger is to be apprehended from the cause than the extent of the hæmorrhage. Individuals who have suffered repeated attacks, are sometimes reduced to a complete state of anæmia ; and the obvious characters of that pathological condition are often the symptoms which first excite suspicion that hæmorrhage is going on from the alimentary canal.

There is nothing definite in the duration of hæmatemesis; it is extremely difficult to ascertain the precise moment when the gastric hæmorrhage commences ; and medical aid is rarely sought until the patient and attendants are alarmed by the vomiting of blood.

Like other formidable affections of the abdominal organs, gastric hæmorrhage occurs most frequently during the middle period of life, from the age of thirty to fifty ; it very rarely occurs in old people, and Chomel thinks that it has never been observed in children.

It is commonly stated, that women are more frequently subject to hæmatemesis than men, and this accords with the writer's experience, and it is generally less formidable and more easily cured in females. In women it may generally be traced to suppressed menstruation, or to insufficient discharge in persons of full plethoric habits and of sedentary occupation. In men it is generally the result of structural change in an important organ, induced almost invariably by habits of life unfavourable to health, by too close application to business, by neglect of proper exercise, by indulgence in the pleasures of the table, and, among the lower orders, by excessive use of ardent spirits. In persons so predisposed, any causes which are capable of exciting congestion of the vessels of the stomach, may bring on an attack of hæmatemesis.

The quantity of blood effused in hæmatemesis varies from a few ounces to several pints. When only a small quantity is extravasated, after undergoing more or less completely the process of digestion in the stomach, it may pass onwards through the pylorus ; and a portion of the blood, doubtless pursues that course in most cases. But when it is vomited, it comes up in large quantities, usually in great part coagulated. Sometimes the coagula appear to have

assumed the form of the stomach; in other cases the clots thrown up are par-
tially deprived of their colouring particles, and resemble the fibrinous concre-
tions so often found within the cavities of the heart after death. The degree of
coagulation of the blood, of its separation into the crassamentum and serum, as
well as the changes in colour the coagula undergo, will generally be in propor-
tion to the time it has remained in the stomach, this depending materially upon
the rapidity of the effusion. The blood ejected by hæmatemesis is usually dark
and partially coagulated, and more like venous than arterial. The colour does
not, however, indicate whether the effusion has taken place from arteries or
veins, but rather the length of time it has remained in the stomach. Dr. Cars-
well in his work on the elementary forms of disease (*Hæmorrhage and Mela-
nosis*), has, more completely than any other author, explained the changes
which take place in the effused blood, both in gastric and intestinal hæmor-
rhage. He states, that the blood effused into the stomach and intestines is
seldom found to present its natural red colour, either when thrown out from
these organs or when contained in them after death. It has often acquired a
dark purple hue, and still more frequently a deep brown tint resembling bistre
or the peculiar blackness of soot. The dark brown and sooty discolorations of
the blood may always be regarded as the result of the action of an acid che-
mical agent formed in the digestive organs, on the effused blood; except in those
cases in which they are produced by the introduction of an acid poison.
Hence he concludes, that the diseases called *black vomit* and *melæna* are mere
modifications of gastric and intestinal hæmorrhage; the black colour being an
accidental circumstance of no importance, and derived from the chemical action
the acid of product on the blood, previous to its evacuation.

The mode of escape of the blood, from the vessels of the stomach in hæma-
temesis, presents the same peculiarities which have been pointed out in hæmor-
rhages from other mucous membranes. The effusion of blood is very seldom
occasioned by the rupture of a blood-vessel, as was formerly supposed; but
far more commonly by exhalation. It is true, that anatomy has not contributed
much information on the pathology of hæmatemesis, because it is very seldom
that such cases terminate fatally immediately; but, in many cases, the evidence
that the blood is exhaled from the mucous membrane is satisfactory and con-
clusive, because we are able to scrutinize minutely the whole extent of
surface, which cannot be so thoroughly done in the bronchial tubes after
hæmoptysis. When death has followed immediately after hæmatemesis, the
mucous membrane of the stomach has, again and again, been found completely
entire and of its natural consistence and texture; sometimes partially red, vas-
cular, and pulpy, or universally so, the submucous capillary network of vessels
being still gorged with blood; in other instances it is quite pale, the congestions
of the capillaries having been completely relieved by the hæmorrhage. Some-
times, again, the gastric membrane is studded with minute dark spots, which
can be made by slight pressure to start from the surface, as if it were sprinkled
with soot or grains of very fine black sand. These latter appearances are cor-
roborative of the opinion, that the blood passes through pores or channels, which
do not, in the natural state, permit its escape. These sandlike bodies, Dr.
Watson thinks, are small portions of blood which have coagulated in the exha-
lant orifices of the membrane, and received from them their shape. The sooty
points, above alluded to, are no doubt small portions of blood acted on by the
free acid in the stomach.

Causes. A point of as great importance as the diagnosis, and upon the solu-
tion of which depends the prognosis or treatment of the case, is the cause of the
hæmatemesis.

The gastric hæmorrhage is sometimes referable to general constitutional dis-
turbance; in other cases it arises from some organic lesion.

When hæmatemesis arises from constitutional disturbance, it is sometimes
attended with symptoms indicative of an active form of hæmorrhage; at other

times, it can only be regarded as a passive effusion, or, in other instances, as a vicarious discharge when some constitutional or habitual flux has been suppressed.

Hæmatemesis, independent of any apparent change of structure in the mucous membrane of the stomach, or in any organ capable of influencing the circulation through that membrane, is certainly rare, although the writer believes that he has met with several such cases. Dr. Watson has stated that he had never seen nor heard of any instances of hæmatemesis, analogous to the epistaxis which is so common in children and young persons, and which, he considers, affords the most familiar examples of idiopathic, or of what we have described as active constitutional, hæmorrhage.

Andral, in enumerating the various causes under the influence of which hæmorrhage may take place from the lining of the alimentary canal, after pointing out the effects of mechanical obstruction to the circulation through the portal vein and those arising from some evident process of iritation of the membrane, adverts to simple congestion of the blood-vessels of the membrane:— " The blood accumulates in the vessels of some part of the mucous membrane, and then escapes from them; and this is all that we are able to discover." (*Précis. &c.*, vol. ii., p, 150.) Such cases are in our opinion instances of hæmorrhage from the alimentary canal, dependent upon constitutional causes. Chomel also writes, " Thus, there are indeed cases, but still in small number, where the hæmatemesis is evidently idiopathic. The complete return to health after such an hæmorrhage leads to the conclusion that it really was idiopathic." (*Dict. de Med.*, vol. x., art. HEMATEMESE.)

Dr. Watson, in the instructive lectures before alluded to, has cited a case from Hoffmann, which we consider to be an example of hæmatemesis of the active constitutional kind, and which he himself admits " exemplifies the manner in which a tendency to hæmorrhage may be allied to constitutional plethora, and be fostered by individual habits of life." Cases of a similar description have also fallen under our own observation : they have almost invariably occurred in robust women, between the ages of thirty and forty, with sallow complexions and dark hair. The hæmatemesis has generally been very considerable, the quantity of blood vomited often amounting to three or four pints. No obvious cause for the occurrence of the hæmorrhage could be discovered, excepting an insufficient action of the bowels. All these individuals recovered by antiphlogistic treatment, of which active purgatives formed the principal element. When hæmatemesis presents those symptoms which lead to the conclusion that it is active in its nature and independent of structural lesions, the principles of treatment which were recommended for active constitutional hæmorrhages, may be adopted without any hesitation. In some cases where there is a threatening of a return of the hæmorrhage, it may be necessary to employ venesection : but in the majority of cases now under our consideration, it will be found that perfect rest, freedom from mental excitement, abstinence from all stimulating food, the free administration of such purgatives as produce copious secretions from the liver and intestines, and the employment of cold or even iced drinks, will generally arrest the gastric hæmorrhage.

Hæmatemesis may certainly occur as a *passive* hæmorrhage, although it is a symptom not often witnessed in this country. When it does happen, there is a tendency at the same time to extravasations of blood in different parts of the body. Such sanguineous exudations are particularly observed in scorbutus, purpura, yellow fever, and some adynamic continued fevers of this country, in which the appearance of petechiæ on the surface of the body is a prominent feature. When hæmorrhages take place from the mucous membrane of any part of the alimentary canal, in the course of these diseases, they are not, according to Andral, indications of any primitive or idiopathic morbid condition of the membrane itself, but merely symptomatic of a more general disease, in fact of the whole mass of the blood. (*Loc. cit.*, p. 151.) It is obvious that, in such

cases, measures directed merely to the repression of the hæmatemesis, which is only a symptom of a more serious constitutional affection, can never be success-ful.   Although it should be the practitioner's object to arrest the further escape of blood, and to promote its expulsion from the alimentary canal, still his prin-cipal aim should be to improve the state of the constitution, upon which this and the extravasations of blood in other parts of the body depend.   The principles propounded for the repression of passive hæmorrhages in general will be in all respects applicable.

The expulsion of the blood from the alimentary canal may be accomplished by active purgatives and glysters.   In such cases mercurials should be avoided. In order to repress the further escape of blood, it is proper to employ those remedies which are supposed to possess a styptic property.   Small pieces of ice may be swallowed by the patient at short intervals, and sometimes with evident good results.   The acetate of lead, in combination with opium, may also be administered in frequent small doses.   The oil of turpentine in doses of ten, twenty, or thirty drops may be given every three or four hours.   Other astrin-gent remedies, both mineral and vegetable, may be resorted to with a much greater probability of restraining passive hæmorrhage from the stomach than from other organs.   If such remedies have any direct influence on the capil-laries of a bleeding surface, it is clear that in passive hæmatemesis there is a great chance of their proving successful, as they are, when swallowed, brought into immediate contact with the bleeding vessels.

The last form of hæmatemesis, independent of local physical changes of structure, is that which appears to be *vicarious* of suppressed menstrual or hæmorrhoidal discharge.   This is certainly the most common variety of what has here been termed constitutional hæmatemesis, particularly in females. Hæmorrhage from the stomach, vicarious of menstruation, may continue for several months or even years, apparently without injury to the constitution. Cullen has affirmed that this species of hæmatemesis is hardly ever a dangerous disease, and this opinion has been confirmed by the experience of subsequent observers.   Nevertheless serious and even fatal consequences have sometimes ensued in such cases, showing the necessity of a cautious prognosis.   Thus, two instances are related by Mr. North, in which suppressed menstruation was followed by repeated and at length fatal hæmatemesis.   In neither of these women was the general health seriously deranged ; nor, previously to hæmor-rhage, did there exist debility or any other symptom calculated to induce the apprehension of danger ; in fact, in both cases a very favourable prognosis was given by experienced physicians, a very short time only before the fatal event. (*Med. Gaz.* vol. x. p. 435.)

These instances are, however, rare exceptions to the usual course of such cases.   More frequently a woman, so affected at the return of each menstrual period, is attacked with some uneasiness of stomach, which is quickly followed by vomiting of blood.   It is generally small in quantity, not amounting to more than a few ounces, of a darkish colour, quite fluid, and of a sour smell.   The hæmatemesis subsides after a few days, when the individual recovers her usual state of health.   The same symptoms recur again and again until the catamenia make their appearance, when the gastric hæmorrhage ceases altogether.   A similar vicarious hæmatemesis may happen to either males or females about the middle period of life, upon the suppression of habitual hæmorrhoidal flux, and disappear when the accustomed discharge has been re-established.

The treatment of these vicarious forms of hæmatemesis consists in attempting to restore the suppressed natural discharge.   The methods by which this object may be attained have been pointed out in the general article on hæmorrhage. It is only necessary again to allude to some of the resources of medical art in encouraging the return of the suppressed catamenia or hæmorrhoidal flux, and to the relief which may be given to the constitution and the probable prevention of hæmatemesis by the application of leeches in the neighbourhood of the uterus

or rectum. It has been well remarked by Dr. Goldie, " that with regard to the restoration of the menstrual function, where its suspension gives rise to hæmatemesis, the means by which this is to be accomplished are rather such as act by removing a condition of the general system unfavourable to regular menstruation, than by the employment of specific emmenagogues." (*Cyc. Pract. Med.* art. HÆMATEMESIS.) It is in such cases that the late Dr. Hamilton, in his work on purgative medicines, so strenuously recommended the employment of purgatives, and numerous practitioners of the present day can bear testimony to the efficacy of that treatment.

Hæmatemesis, depending upon structural disease, is a very formidable malady. The lesion may exist in the coats of the stomach itself, or in some other organ exercising an influence over the circulation of the stomach. The principal pathological conditions of the mucous membrane of the stomach which give rise to hæmorrhage appear to be, 1, the congestive stage of inflammation of the internal or mucous surface ; 2, ulceration ; and 3, carcinoma of the coats of the stomach.

Hæmatemesis very rarely occurs as the consequence of the congestive stage of inflammation of the mucous surface, except when corrosive poisons are taken into the stomach, and then they induce violent inflammation and hæmorrhage to a considerable extent. This is only one of a number of serious effects produced by the introduction of such substances into the stomach ; the consideration, however, of this form of hæmatemesis, and its appropriate treatment, belongs to Toxicology. Dr. Carswell has given an accurate description of the state of the mucous membrane of the stomach in that peculiar form of a gastric hæmorrhage, which is produced by the irritation of poisonous substances. He states, " that isolated patches of a dark red, deep brown, or almost black colour, having the aspect of ecchymosis, are found upon the lining of the stomach. When these are examined narrowly, they are found to consist either of blood alone, effused into the mucous or submucous tissues, or of blood and a congeries of tortuous vessels. In such situations, portions of the mucous membranes are observed in a state of sphacelus. The intervening mucous membrane may be perfectly healthy, or present a considerable degree of congestion, the tendency of which to terminate in hæmorrhage is marked by the clustering together of the capillaries in numerous points, and the effusion of small specks of blood." (*Elem. Forms of Dis.*)

Another lesion which is known to be the cause of gastric hæmorrhage is ulceration of the mucous membrane of the stomach. This sometimes consists of a number of very small superficial ulcers, extensively distributed over the surface : some of them are covered with a small dark coagulum of blood ; others present a mere speck of blood, occupying, perhaps, the opening of the duct of a mucous follicle. A more uncommon and incurable lesion which gives rise to gastric hæmorrhage is that which exposes and perforates the coats of some vessel ramifying in the walls of the stomach. Andral states that such cases are extremely rare, and that not more than five or six well-authenticated instances are to be found on record. He refers to two of them. (*Loc. cit.*, p. 154.) An interesting case of this kind is delineated in Dr. Carswell's work. Several ulcers had existed in the stomach, and some had cicatrized ; the fatal hæmorrhage had taken place from the base of an ulcer which had perforated the coronary artery. An instance of this rare and fatal form of hæmatemesis occurred some years ago in St. Bartholomew's Hospital, among the patients under the care of Dr. Latham. This person was a middle-aged man, who stated that, for the space of two years, he had suffered from pain across his chest, vomiting after food, palpitation, and constipated bowels. He confessed that he had habitually indulged in alcoholic potations. His countenance was dusky and exsanguined. Two days before his admission he was seized suddenly with giddiness and faintness, followed by the vomiting of two quarts of blood. He lived only three days after his admission into the hospital, and upon

each day there was a return of these symptoms, with vomiting and purging of blood.   Upon examination of this man's body after death, the cavities of the heart were found empty of blood, and all the great viscera bloodless.   The stomach contained two pints of coagulated blood and some dirty red fluid, and about a pint of grumous blood was found in the intestines.   In the smaller arch of the stomach there was a small excavated ulcer with hardened edges, and at its base the orifices of two or three branches of the coronary artery, laid open by ulceration were visible.   Another example of this rare form of hæma-temesis is preserved in the museum of St. Bartholomew's Hospital, in which a large ulcer has destroyed the mucous membrane of the stomach and part of the pancreas, and has laid open the splenic artery, from which fatal hæmorrhage occurred.

Carcinoma of the stomach is another lesion which is frequently accompanied by hæmorrhage.   Under such circumstances hæmatemesis may occur as one of the earliest indications of the approach of this formidable disease, as well as in its later stages.   When the submucous cellular tissue is passing into the state of scirrhus, the mucous membrane itself occasionally pours forth blood in the form of exhalation.   Andral states that he has more than once found the mucous membrane of the stomach covering a mass of scirrhus perfectly healthy in individuals, who had abundant hæmatemesis shortly before death.   (*Loc. cit.* p. 153.)   When it occurs at the later stages of carcinoma, it may be owing to the erosion of some considerable vessel, in the course of the destructive ulceration; or, what seems to be more common, it may result from a kind of general oozing or exhalation from the surface of the irregular ulcer, similar to that which is believed to proceed from the lining of pulmonary cavities in some cases of tuber-cular disorganization of the lungs.

When hematemesis occurs from ulceration of the mucous membrane of the stomach, whether simply follicular or the result of carcinomatous degeneration, it is generally preceded by a long train of symptoms indicating disease of that viscus.   Nevertheless it is well known, that extensive ulceration of this mucous membrane does occasionally go on for a long period without symptoms which clearly indicate its presence.   Several remarkable cases of this description are related by Dr. Abercrombie and other authors.   In such individuals a sudden, copious, and fatal hematemesis may come on, and, after death, one or more ulcers are found in the stomach.

The treatment of hæmatemesis resulting from such lesions, resolves itself into that which is considered appropriate to the disorganization suspected to exist in the stomach.   In the majority of these cases the hæmorrhage is very abun-dant; and even if arrested for a few hours, generally returns and produces fatal syncope.   Every effort should be made to tranquillize the general circulation, and to arrest the gastric hæmorrhage; for which purpose ice taken into the stomach is often attended with good effects.   The acetate of lead in combination with opium may be given freely.   All irritating styptics (as the mineral acids, or oil of turpentine) should be avoided.   Whatever nourishment is taken into the stomach in such cases, should be in the form of cold liquids, and the strength of the patient upheld by nutritive glysters.   This perhaps, is the utmost that can be accomplished by medical art.

The last form of hematemesis to be noticed is that which may be termed *sympathetic*, in which the hæmorrhage does not depend upon disease of the stomach itself, but on some organ capable of influencing the flow of blood through the capillary system of that viscus.   The viscera, the morbid altera-tions of which are most liable to induce hæmatemesis, are the liver and the spleen, and next, those of the lungs and uterus.   All obstructions to the cir-culation through the liver must necessarily cause congestion of the portal vein and its tributary branches, as well as of the capillary circulation of those organs which return their venous blood through that vein.   In some cases the result of this general abdominal congestion is the effusion of serum into the peritoneal

cavity; in other cases the congestion is relieved by exhalation of blood from the mucous membrane of the stomach or the intestinal canal, giving rise to hæmatemesis or intestinal hæmorrhage.

Although the functions of the spleen are by no means completely understood, still, from its highly vascular, cellular, and extensible structure, it is undoubtedly capable of acting as a receptacle or reservoir for the venous blood, when its free passage through the liver or the right side of the heart is obstructed. Whenever the portal system becomes overloaded, one of its earliest effects is congestion and enlargement of the spleen. By this means congestion of the other organs within the abdomen is diminished or obviated; but the spleen will not admit of distension beyond a certain extent; and, moreover, if it be very frequently congested or remain for some time unrelieved, the consequence is the stagnation of the blood in the splenic cells and induration of its substance. It is easy to perceive that under such circumstances any accidental obstruction of the portal vein must relieve itself through other channels, and it is in this way that the connexion of hæmatemesis with enlargement of the spleen is explained. When gastric hæmorrhage is the consequence of disease of the spleen, it frequently acts most beneficially upon this organ, for it has been observed to diminish in bulk, as the blood was poured out from the stomach.

Dr. Watson mentions that he has witnessed this phenomenon more than once, and that he had regarded the tumid condition of the spleen as an evidence of venous obstruction elsewhere. Latour has detailed several examples of the coexistence of enlargement of the spleen with hæmatemesis. One of his patients, who had long been living in a malarious district, and who had suffered from an obstinate ague, was attacked with enlargement of the spleen, which gradually occupied nearly the whole abdomen. He predicted that hæmatemesis would probably supervene on this conditition of the spleen, and accordingly he was one night hastily summoned to his patient, and found that he had vomited an enormous quantity of coagulated blood, and that a good deal had also passed off by the bowels. This hæmorrhage recurred from time to time, till in the course of a month the enlarged spleen was so reduced in bulk that it could no longer be felt in the abdomen, and the patient lived to enjoy good health for twenty-five years afterwards. (*Med. Gaz.* vol. x.)

Mr. Twining, in his work on the diseases of Bengal, when describing the assemblage of symptoms which constitutes the endemic cachexia of tropical countries where paludal exhalations prevail, informs his readers that enlargement of the spleen is the most frequent attendant on this cachexia. The tumefaction of the spleen often takes place so suddenly, that in a few days it can be seen as well as felt extending far below the cartilages of the left false ribs. The degree of enlargement which occurs is variable; in extreme cases the diseased spleen fills more than half the abdomen, extending to the right of the navel, while its lower extremity reaches the left iliac region. Cases of this enormous tumefaction may be frequently seen in Calcutta; some of them recover. Hæmoptysis, as well as hæmatemesis, occasionally occurs in such cases, when the spleen is very large; and probably the blood which is vomited sometimes flows into the stomach from vessels communicating directly with the splenic vein, as the intumescence of the spleen has been observed in some cases to be immediately reduced by these evacuations of blood. These profuse hæmorrhages sometimes suddenly destroy life: but in other cases, when the functions of the system have not been much disordered previously, the patients recover quickly after these profuse losses of blood, the enlargement of the spleen for the time subsides, and the disease is thus entirely cured. Such instances afford us useful hints for the treatment of enlargements of the spleen when they are not of long standing.

When hæmatemesis can be ascribed to morbid conditions of the liver and spleen, the hæmorrhage is apt to recur; perhaps there is no form of hæmorrhage, with the exception of uterine, which reduces the patient to such a blood-

less condition; the aspect of individuals who have thus suffered is so striking, that it is often sufficient at once to indicate the real nature of the case.

The treatment of hæmatemesis depending on morbid conditions of the liver and spleen consists in the employment of remedies directed to those viscera. It is better to anticipate the extravasation of blood by local depletion over the liver or spleen, by the application of cupping glasses or leeches. Purgatives may at the same time be freely employed, with the other measures recommended for organic diseases of the liver and spleen.

Examples of what has here been called sympathetic hæmatemesis are sometimes met with in the advanced stages of pregnancy. The want of periodical recurrence, and the complete absence of the hæmorrhage during the early months of pregnancy, are circumstances which sufficiently refute the opinion once entertained, that this form of hæmatemesis was supplementary of the suppressed catamenia. Such cases of hæmatemesis seem to be occasioned by mechanical obstruction to the circulation through the abdominal aorta and the iliac arteries.

Lastly, any morbid condition of the thoracic viscera capable of obstructing the circulation, if it come on rapidly and be not relieved by art, may excite congestion and hæmorrhage from the mucous membrane of the stomach, but such cases are uncommon.

HÆMORRHAGE FROM THE INTESTINES.

Symptoms and sources of the hæmorrhage.—Characters of the effused blood.—Prognosis.—Causes.—Constitutional disturbance and structural lesions.—Intestinal hæmorrhage may be active, passive, or vicarious.—Symptoms and treatment of these forms.—May originate in connexion with organic lesions, viz., inflammation of the intestinal mucous membrane.—Ulceration.—Carcinoma.—Diseased liver and spleen.—Symptoms and treatment of these forms.

In intestinal hæmorrhage the blood may be effused from a more or less extensive portion of the intestinal mucous membrane, or from a limited portion only. In the former case, in which the effused blood is intimately blended with the secretions, giving them a very dark or almost black colour, the disease has been termed *Melæna* (from μελαινος, signifying black).

The early *symptoms* of melæna are by no means so striking nor so easily recognised as those of hæmatemesis; indeed, it not unfrequently happens that cases of simple malæna, or purging of dark blood, may continue for some time without the individual being aware of it. The pale sallow face, the bloodless conjunctiva, the blanched lips, the yellow tawny flabby tongue, the thrilling pulse, immediately arouse the suspicion of internal hæmorrhage. If the evacuations be examined, they are offensive and dark-coloured, or black as pitch.

Upon further inquiry, it will generally be discovered that the individual has experienced some uneasiness, sense of weight, or dull pain at the epigastric or hypochondriac regions; tormina and relaxation of the bowels, preceded by constipation and frequent sensation of faintness and exhaustion. The abdomen is often, at the same time, full and tender, particularly in the epigastric region, and in many cases careful examination detects an enlarged viscus, with more or less local tenderness.

Whenever an opportunity is afforded of inspecting the stools, the existence of hæmorrhage from the bowels is at once discovered, but some doubts may arise as to the particular part of the alimentary canal which is the source of the hæmorrhage. It has already been stated, that where hæmorrhage takes place

from the stomach in small quantities, no hæmatemesis may ensue, and the effused blood will pass the pylorus, and thus give a dark hue to the stools. It would be extremely difficult, in such a case, to pronounce whether the blood had been poured out from the mucous membrane of the stomach, the duodenum, or the jejunum. It would be the preponderance of gastric over intestinal disturbance which would lead us to the conclusion that the blood escaped from the stomach. On the other hand, the blood may have escaped from the hæmorrhoidal vessels.

There are several symptoms which tend to distinguish melæna from the hæmorrhoidal flux. The blood which escapes from the hæmorrhoidal vessels is generally of a florid red colour, and passed after the natural evacuations; but, in melæna, the stools are black, or nearly so, and the blood is intimately blended with the evacuations. The pain and uneasiness in melæna is felt throughout the abdomen, while in the former these symptoms are confined to the rectum.

The quantity of blood which passes from the intestines in melæna is very uncertain, and never equals that which is poured forth from the stomach by hæmatemesis; indeed the blood is generally so intimately mixed with the intestinal secretions, that it is difficult to estimate its amount accurately. In some cases, where the blood seems to escape almost entirely from the mucous membrane of the lower bowels, half a pint to a pint may be passed each time the person goes to stool for several days in succession.

The quality of the blood is generally very peculiar and remarkable; its colour is often so dark, or almost black, that the stools resemble pitch. The intense blackness and pitchy character of the stools in melæna have caused some authors to doubt whether these evacuations really do consist of altered blood. Dr. Ayre, in his *Treatise on Marasmus*, has contended, that as traces of lesion in the intestinal mucous membrane are so very rare in cases of melæna, that the black discharges are not the result of hæmorrhage from the mucous membrane of the intestines, but are derived from the minute ramifications of the portal vein in the glandular texture of the liver. He argues that a certain degree of congestion of that important organ will occasion an excessive secretion of vitiated bile, constituting the common autumnal cholera, and the various modifications of bilious complaints; but that when this hepatic congestion occurs to a still greater extent, the secreting ramifications of the vena porta no longer eliminate bile, but pour forth a dark and highly carbonized blood, unchanged into secretion: that this dark fluid passes through the minute biliary pores, and is conveyed through the common excretory hepatic ducts to the duodenum, whence it regurgitates into the stomach, or is carried downwards along the intestines. Dr. Ayre therefore conceives that melæna differs but in degree, in the pathological condition which occasions its symptoms, from cholera and other bilious disorders.

This explanation of the origin of the phenomena of melæna is certainly ingenious, but must be regarded merely as an hypothesis. Dr. Ayre has not supported this view by the only evidence which can be satisfactory, namely, the detection of such morbid hepatic secretions in the biliary ducts. On the other hand, morbid anatomy has frequently revealed the presence of dark blood in the intestinal canal in those cases where, during life, these dark stools had been observed to pass from time to time. It is true that cases do occur in which the stools consist almost entirely of dark, black, or greenish black bile, of the consistence of treacle, closely resembling the stools of melæna. If this colour of the stools be caused by vitiated bile, the addition of water will impart to them a greenish or greenish-yellow hue; if it be dark blood, the addition of common salt (chloride of sodium) will impart a blood-red colour to the evacuations, thus indicating an admixture of blood. Melæna, when it occurs alone, is not so fatal as uncomplicated hæmatemesis; this difference arises partly from

the quantity of blood lost being less, and partly that it does not so often arise from structural lesion of the mucous membrane.

With reference to the frequency of the disease, it is difficult to give any certain information. There certainly are more constitutional affections which are attended with intestinal than with gastric hæmorrhage. In warm climates it is very common, particularly in those countries where dysentery is endemic. Even in England there sometimes appears an epidemic tendency to melæna. Thus, during the autumn of 1838, a large number of persons among the out-patients of St. Bartholomew's Hospital complained of severe pains in the bowels, with purging of dark matter, which some described distinctly as blood, others as dark fluid-like pitch. The number was so much above the usual average of such cases as to excite a suspicion of an epidemic tendency to hæmorrhage from the bowels. During the same period, the number of cases of ordinary autumnal cholera was less than usual. This tendency to intestinal hæmorrhage is also corroborated by the analogous phenomenon, that dysentery was, during the same period, prevalent, almost as an epidemic, on board the Seaman's Hospital Ship in the river Thames.

With respect to the mode of escape of the blood from the vessels of the mucous membrane of the intestines, little can be added to what has already been stated on this point in discussing hæmatemesis. Intestinal hæmorrhage offers additional proof of the frequency of the escape of the blood by exhalation, and not from ruptural vessels.

When cases of melæna terminate fatally, it is much more common to find the mucous membrane of the intestines entire, than with any abrasion of surface. It may be red, from congestion of its vessels, or it may be quite pale, the escape of the blood having entirely removed all appearances of congestion. Sometimes, the whole track of the canal is found covered with grumous blood, and the mucous membrane evidently stained by the imbibition of the coloured particles of the blood after death.

Occasionally the orifices of the mucous follicles appear like small black spots scattered thickly over the surface ; the membrane looks as if it had been sprinkled with soot. Sometimes a small quantity of blood may be expressed from the orifices of these mucous follicles.

The lesions of the intestinal membrane, which are sometimes found in connexion with melæna, will be described under the causes of intestinal hæmorrhage.

Causes. It is important in cases of melæna, as well as in hæmatemesis, to distinguish, with as much accuracy as possible, the nature of the cause which gives rise to the hæmorrhage. It is evident that on such careful discrimination alone can a rational pathology of the case, or a judicious system of treatment be attempted. It is sometimes associated with the usual symptoms of an active constitutional hæmorrhage. It is in the course of continued fevers that this form of bleeding from the bowels is most commonly met with ; the older physicians were in the habit of regarding these discharges of blood as critical evacuations, and were unwilling to interfere with them. In the present day physicians are in the habit of regarding them merely as indications of congestion of the mucous membranes of the bowels, which has relieved itself without the intervention of art. If such discharges of blood from the bowels be excessive, those means of controlling them may be adopted, which have been pointed out as suitable in other active hæmorrhages. If the quantity discharged be moderate, the hæmorrhage requires but little interference. The blood poured out in such cases is usually fluid, of a darkish-red colour, and does not partake of those peculiar characters observed in melæna.

Intestinal hæmorrhage, and discharge of dark blood with the stools, may present itself with all the characters of a passive hæmorrhage. It is in those constitutional affections, where the whole mass of the blood has become vitiated, that we meet with this form of intestinal hæmorrhage ; it occurs particularly in

scorbutus, purpura hæmorrhagica, in fevers of the petechial type, and malignant small-pox. The loss of blood from the bowels adds materially to the gravity of the constitutional affection, and should always be arrested as soon as possible. The treatment of this form of intestinal hæmorrhage is necessarily subordinate to that pursued for the improvement of the state of the constitution on which it depends. The remedy which has acquired the highest reputation in the treatment of this passive melæna is the oil of turpentine in doses of ♏xx, given every six or eight hours. Occasional doses of very mild aperients are also beneficial.

Melæna is very commonly met with as a vicarious discharge where the catamenial secretion has been scanty, or altogether suppressed. Such cases are generally combined with hæmatemesis, and present some of the least alarming and most tractable forms of hæmorrhage from the alimentary canal. The immediate symptom of intestinal hæmorrhage may generally be removed by the free exhibition of purgatives. When this is accomplished, the return of the natural periodical discharge should be promoted by those remedies which have already been recommended as efficacious in the treatment of vicarious hæmorrhages in general, and vicarious hæmatemesis in particular.

We have, lastly, to point out the various organic lesions which give rise to intestinal hæmorrhage, whether they be situate in the alimentary canal or elsewhere. Inflammation of the mucous membrane of the intestines may be attended with escape of blood from its vessels both in the early and at the more advanced periods, when it has terminated in ulceration. The former is of rare occurrence, and of little importance, and generally soon yields to the remedies which are employed to control the inflammation. The intestinal hæmorrhage, resulting from ulceration of the mucous membrane, in cases of dysentery, continued fever, or invagination of a portion of intestine, is a most formidable and fatal symptom. The quantity of blood lost in such cases is often very considerable, and passes from the bowels very little changed. The individual, however, is reduced to the most imminent danger, and sometimes expires shortly after passing a large quantity of blood. In such cases the mucous membrane of the bowels is found after death more or less extensively ulcerated. In fever, the ulcerations are generally situated in the lower third of the ileum, while in dysentery the lining of the colon is to a greater or less extent disorganized.

The treatment of such cases must consist in the most rigid diet, carefully avoiding all substances which can prove irritating. Opium may be employed freely, as it is desirable to lessen the peristaltic motion of the intestines. Every effort should be made to keep the whole alimentary canal as much as possible in a state of repose, and thus allow of the processes of reparation to go on uninterruptedly.

Purging of blood is also connected with carcinomatous ulceration of the intestines. The hæmorrhage recurs from time to time, accompanied with other symptoms denoting disorganization of the coats of the intestines. Such cases often at first appear to yield to treatment, but this apparent amendment is fallacious, as the symptoms return, and proceed, sometimes speedily, to a fatal termination.

The last form of melæna to which it appears necessary to advert, is that which affords an example of sympathetic hæmorrhage, where the congestion and exhalation from the mucous membrane depends on disease of the liver or spleen.

Persons in the middle periods of life, who are labouring under hepatic congestion and constipation, are sometimes attacked with profuse hæmorrhage from the bowels. The blood in such cases is generally dark and fluid, and appears to come from the large intestines exclusively. The treatment of such cases consists almost entirely in the exhibition of mercurials followed by aperients, especially castor oil. When free evacuations are obtained, the discharge of blood generally ceases. The hæmorrhage, however, often continues for several

days, and occasions considerable alarm and depression of spirits, but ultimately the patient does well.

Inflammation of the substance of the liver, when it is extensive, and where bloodletting has not been employed sufficiently, is occasionally accompanied by bleeding from the intestines. The blood is dark and fluid, but not usually of the dark pitchy appearance which characterizes true melæna ; the absence of such changes in the effused blood may be accounted for, by the blood being expelled shortly after its extravasation by the purgatives employed in the treatment. It is obvious that in this class of cases the measures adopted to control the hepatitis will be sufficient to arrest the intestinal hæmorrhage.

Any other structural disease of the liver, which pervades that organ very extensively, and which particularly affects the ramifications of the vena portæ, may be accompanied by occasional hæmorrhage from the stomach or intestines, or from both. In these cases the blood discharged is dark and grumous, the stools presenting all those characters which constitute true melæna. This form of melæna occurs principally in persons of broken down constitution, and who have been addicted to spirit drinking. It is often complicated with, or succeeded by, ascites, and is one of the most alarming and incurable forms of intestinal hæmorrhage. In such individuals the free and indiscriminate employment of purgatives cannot be borne ; and, unfortunately, in such persons the kidneys often exhibit symptoms of serious disorganization. The means by which the constitution may be relieved are restricted within a very small compass, and it requires the utmost skill of the practitioner to meet the successive emergencies of the case. Upon some occasions it is prudent to deplete locally by the abstraction of blood near the liver ; at other times mercury and purgatives, or perhaps diuretics, are indicated.

Enlargements of the spleen are frequently accompanied by hæmorrhages from the whole mucous membrane of the alimentary canal. The pathology of these cases has been enlarged upon in the description of hæmatemesis, and little more remains to be added here. The blood discharged from the bowels has the peculiar melanoid characters. There is often at the same time considerable exhaustion of the vital powers. When the strength of the patient will admit of the treatment, local depletion over the spleen and the free use of purgatives are to be employed. Preparations of mercury are not borne so well as in melæna arising from disease of the liver, besides that salivation is easily induced. It is not uncommon to observe purpurous spots on the skin in conjunction with melæna and enlarged spleen, a pathological condition which indicates a vitiated state of the blood. Nevertheless this variety of melæna is not so incurable nor so fatal as that connected with diseased liver.

HÆMORRHAGE FROM THE URINARY ORGANS, OR HÆMATURIA.

Derivation and signification.—Characters of bloody urine.—Substances taken as food impart a red colour to the urine.—Other deceptive appearances.—Tests for the presence of blood in urine.—Sources of the blood.—Urethral hæmorrhage.—Vesical hæmorrhage.—Renal hæmorrhage.—Diagnosis.—Causes.—Peculiar states of the constitution.—Local lesions—active—passive—vicarious.—Symptoms and treatment.—Hæmaturia arising from morbid conditions of the urinary organs.—Symptoms and treatment.

HÆMATURIA (derived from the Greek words αιμα, blood, and ουρεω, I pass urine) signifies the discharge of bloody urine. According to its strict etymological sense, this term should be restricted to those cases in which blood, having been

effused within the urinary organs, is discharged, mixed with the urine.   In the present day, however, hæmaturia is generally understood to express any hæmorrhage from the urinary organs.

The same objections, which have been raised against the employment of the word hæmatemesis to designate gastric hæmorrhage, apply with equal force to the use of the term hæmaturia, to signify hæmorrhage from the urinary organs.

Hæmaturia is a much more uncommon form of hæmorrhage than that which takes place from the lungs or alimentary canal ; and as it rarely terminates fatally, its pathology is by no means established on such satisfactory proofs as that of hæmorrhages from these latter parts.   In a supposed case of hæmaturia, the first point of inquiry is, to ascertain whether the blood is actually mingled with the urine.   When blood is passed from the urinary organs in very considerable quantities, there can be very little difficulty in recognising its presence ; but when the proportion of blood is scanty, when it is intimately blended with the urine, when this secretion contains an excess of lithic acid and its compounds, whereby the characters of the colouring matter of the blood are materially changed ; or when the urine contains pus, mucus, or bile,—it requires some attention and knowledge of animal chemistry to pronounce with certainty on the existence of blood in the urine.

When blood is passed in very considerable quantities from the urinary organs, after remaining a short time in the vessel into which it has been voided, it coagulates into a consistent gelatinous-looking mass, not unlike red currant-jelly, particularly when a portion of it is viewed by transmitted light.   This gelatinous mass afterwards separates into a smaller clot, resembling the crassamentum of the blood, and into a reddish serum, which gradually deposits a quantity of blood globules.   If the colourless fluid which afterwards remains be exposed to heat, a quantity of albumen may be readily detected by its coagulation.   The appearance of a large quantity of blood in the urine is, however, an extremely rare occurrence.

But a considerable quantity of blood may be passed, intimately blended with the urine, and not present such unequivocal proofs of its real nature.   The urine may be turbid, of a chocolate or coffee brown, or almost black colour. There is no distinct separation of the fluid into crassamentum and serum, as in the class of cases just mentioned, but it partially separates into a grumous sediment, consisting of flocculi of fibrin mixed with the red particles and a supernatant fluid, which retains some of the colouring matter of the blood.   If this semitransparent fluid be heated to 160° Fahr., it gradually becomes turbid, and at least exhibits an abundance of coagulated albumen.   When bloody urine is voided of these different shades of brown colour, it is generally found to contain an excess of free acid, which it is well known has the peculiar property of changing the colouring matter of the blood to brown or black.

A very common appearance of the urine when it contains blood, is that of a clear reddish fluid with a number of colourless flakes or shreds floating through it.   These colourless shreds are undoubtedly the coagulated fibrin of the blood, which has assumed various forms in its passage through the urinary organs and their excretory ducts.   Sometimes these coagula are perfectly cylindrical, and bear considerable resemblance to intestinal worms.   The serum after a time deposits the coloured particles, and, if it be subjected to the test of heat, it generally affords unequivocal proofs of its holding in solution the albuminous parts of the blood.   When the urine presents these characters, there can be no doubt that it contains blood, and that it has been effused gradually from some point near to the kidney itself.

When the blood exists in the urine in smaller quantities, or when hæmaturia occurs in the course of purpura, malignant confluent small-pox, scarlatina, or typhoid fevers, the urine is voided of a dark red or brownish colour ; it is less

transparent than healthy urine; the fibrin does not separate as in the above-described instances, but a certain quantity of the colouring particles of the blood is gradually deposited. Such urine sometimes exhibits an acid, at other times an alkaline or neutral condition; and it will greatly depend upon the condition of the urine, whether the application of heat renders it more turbid, and ultimately produces the coagulation of the albuminous constituents of the blood. In such cases there may be some difficulty in pronouncing with certainty on the presence of the blood in the urine.

We are not, however, in every case to presume that urine of a red colour, or of a very dark hue, derives its peculiar tint from the admixture of a portion of blood. The urine may be quite red or almost black, and yet perfectly free from admixture of blood. Dr. Watson has adverted to several substances, which, when taken as food, invariably impart a red colour to the urine. (*Med. Gaz.*, vol. x., p. 470.) One of these is the prickly pear or Indian fig, as it is commonly called, the *Cactus opuntia*. When the Spaniards first took possession of America, many of them were alarmed by observing that they made what they supposed to be bloody urine; but it was soon discovered that this was owing to the abundant use of that fruit. Other travellers in America have observed a similar phenomenon. No inconvenience apparently resulted from this condition of the urine. It would appear that the juice of this plant may be analyzed into a crimson dye, by other processes besides that of the cochineal insects. Another vegetable substance, which is consumed in large quantities by some persons, and which is said to produce the same effect, is beetroot. Desault relates the case of a person who observed that every morning he passed urine of a deep red colour, exactly like that which results from mingling blood with the urinary secretion. No deposit took place from the urine. The man, alarmed at the idea of passing blood, consulted M. Roux, who, after some examination, suspected that the urine owed its red colour to some other cause than admixture of blood. In fact it was ascertained, that this person was in the habit of supping every night on the red beetroot: when this article of diet was relinquished, M. Roux found that the urine resumed its natural appearance. A similar change in the colour of the urine is said to be produced by the use of madder as food, by some species of strawberries, and by drinks made of sorrel. It is necessary to be aware of the effects of such articles upon the urine, which might otherwise be mistaken for formidable disease of the urinary organs. Again, by resorting to such artifices, impostors may easily feign serious disease, and thus obtain admission into charitable institutions, or procure exemption from services which are disagreeable to them. It has already been stated that bloody urine is often of a dark brown or even of a black tint, and this colour is produced by the action of a free acid in the urine on the colouring particles of the blood; but urine may acquire a mahogany brown or even black colour, from other causes besides the admixture of blood with it. In severe cases of jaundice, and in all diseases of the liver where the bile does not pass into the intestines, the urine is frequently found to present this dark hue. This simply arises from the concentration of the natural yellow tint of the bile, which in such cases exists in large quantities in the urine. When this dark urine is diluted with water, it immediately assumes a bright yellow colour.

Another, but very rare, cause of the dark colour of the urine is the presence of a peculiar principle, to which Dr. Marcet gave the name of melanic acid. With these exceptions, when the urine is of a dark brown or blackish colour, it owes that quality to the circumstance of its containing blood. In all doubtful cases, however, a few simple tests will, in general, prove with sufficient accuracy the presence of blood in the urine. When blood exists in the urine in small quantities, it becomes less transparent than natural; and upon the application of heat, more turbid, in consequence of the coagulation of the albumen. If a piece of white linen be immersed in bloody urine, it imparts a reddish tinge,

not easily mistaken. When urine is of a reddish colour from the excess of lithic acid, it is transparent when voided, but deposits a sediment on cooling, which sediment may be redissolved upon heating the urine.

The seat of hæmorrhage in hæmaturia will be determined by a careful observation of the nature and appearances of the effused blood, and of the symptoms which precede and accompany the excretion of it.

Urethral hæmorrhage. This is easily recognised. When pure blood comes away in drops or a scanty stream, unmixed with urine, and neither preceded nor accompanied by any desire to pass urine, it may be inferred that the urethra is the seat of extravasation. In such cases, when the urine is passed, it is limpid, and free from any notable bloody tinge; the small quantity of blood, which the urine carries along with it in passing through the urethra, not being sufficient to produce any perceptible change in its colour. Pure blood, which escaped from the urethra before the expulsion of the urine, will again make its appearance after the bladder is emptied.

Besides, bleeding from the surface of the urethra is generally the consequence of some mechanical injury of the lining membrane of that canal. A very remarkable case is cited by Dr. Watson, which renders it probable that blood is sometimes exhaled in considerable quantities from this membrane, when causes which produce a strong determination of blood to this part have been in operation. Thus, a young man was admitted into the Middlesex Hospital, with hæmorrhage from the urethra, who said that he had lost a considerable quantity of blood in this manner in the course of a few hours. The hæmorrhage appeared to have been the immediate consequence of an excessive indulgence in sexual intercourse, he having passed the preceding night in company with a female. The bleeding was permanently arrested by the introduction of a bougie, which was allowed to remain a short time in the urethra.

Vesical Hæmorrhage. Hæmorrhage from the bladder is of more common occurrence than that from the urethra. There are many causes which may operate either directly or indirectly on that viscus, and excite bleeding from its mucous membrane. Sometimes the blood is poured out in very small quantities, at other times the hæmorrhage is very profuse. In the former case the urine is only slightly tinged with blood, while pure blood and mucus follow its expulsion. At the same time there is pain in the situation of the bladder, often extending along the urethra, accompanied with frequent and urgent desire of micturition. With these symptoms of disease or irritation of the bladder, there is an absence of symptoms referrible to the kidneys or ureters. When the vesical hæmorrhage is profuse, it very soon produces a series of most distressing symptoms. While the serous portion of the blood passes off of a dark brownish colour, the remainder coagulates in the bladder, and becomes a source of inconvenience, suffering, and even danger, to the patient. At first there are the feelings of dull pain in the hypogastric region, and weight at the neck of the bladder; afterwards, all the symptoms of retention of urine appear, and lead very generally to a fatal termination, when the bladder is found distended by a large coagulum of blood. The formation of such a coagulum may be suspected when the patient suddenly passes a quantity of pure blood, which is followed by the expulsion of dark brown urine, depositing a coloured sediment, and the supervention of the symptoms above described.

When there are symptoms of stone in the bladder, or disease of that viscus can be ascertained, and when the passage of pure blood is followed by the discharge of bloody urine, there can be little doubt that the bladder is the seat of the hæmorrhage; and this diagnosis will be corroborated by the absence of symptoms referrible to the kidneys and ureters.

Renal Hæmorrhage. When hæmorrhage from the kidney is not very abundant nor rapid, the blood is discharged intimately blended with the urine: when blood is passed from the kidney in greater abundance, the fibrinous portion

coagulates as it passes towards the bladder, and then the urine not only has a reddish or darker hue, but contains coagula, often having the mould of the excretory ducts. This appearance is generally considered characteristic of renal hæmorrhage, or of escape of blood towards the commencement of the ureter.

The bleeding may be presumed to come from the kidney, or the commencement of the ureter, when there is a sensation of heat or of weight, or some degree of pain in the situation of one kidney ; and this presumption is strengthened if calculi have been previously passed from the kidney, and if there be no symptom of stone or other disease of the bladder.

There is a still greater certainty as to the source of the hæmorrhage in hæmaturia, when there are symptoms which denote the passage of concretions from the kidney, through the ureter, to the bladder. There are sharp intermitting pains in the loins and abdomen, following the course of the ureter, and radiating to those parts receiving filaments from the lumbar plexus of nerves, particularly to the thigh and testicle. Nausea and vomiting are frequent concomitants.

It appears, then, that in many instances the appearance of the blood, taken in conjunction with the local symptoms, points out, with tolerable precision, from what part of the urinary organs the hæmorrhage occurs ; but many cases of hæmaturia are undoubtedly obscure with reference to the actual source of the hæmorrhage. Blood may appear mixed in a greater or less quantity with the urine, without pain or other symptom to lead us to fix upon one part rather than another, as the source of the hæmorrhage. It is the opinion of Dr. Watson, " that hæmaturia bearing this indeterminate character is generally found to be renal, and to depend upon calculous disease." (*Med. Gaz.* vol. x. p. 472.) This opinion was also evidently entertained by Dr. Heberden in the following passage in his *Commentaries :*—" Urine made of a deep coffee-colour, or manifestly mixed with a large quantity of blood, has within my experience been very rarely the effect of any thing but a stone in the urinary passages. I therefore suppose a strong probability of this cause, whenever I see this appearance." In the few cases of severe hæmaturia which have fallen under our observation, the local symptoms have certainly been ambiguous, but they have rather led to the suspicion of some cause of irritation, as a calculus in the kidneys.

The symptoms which accompany hæmorrhage from the bladder are generally much more marked than those which attend on renal hæmorrhage. Calculus in the bladder, or serious disease of that viscus, cannot long remain without affording manifest symptoms, and certainly could not induce hæmorrhage from the mucous membrane without the patient suffering, at the same time, many other most painful symptoms. But calculi form in the pelvis of the kidney, and malignant disorganization may be going on in its substance without symptoms indicative of their existence. It will strengthen the presumption that the kidney is the source of the hæmaturia, if it has succeeded a fall, strain, or blow upon the back, or perhaps a long ride on horseback.

It will be inferred from the preceding remarks that the diagnosis of the source of the blood in hæmaturia, founded on the local symptoms, is far from being conclusive.

Cases of hæmaturia present examples of the different modes in which hæmorrhage takes place from the respiratory and alimentary canals. Sometimes it may be traced to some peculiar condition of the constitution ; in other instances, to the operation of purely local causes.

Constitutional or idiopathic hæmorrhage from the urinary organs is, undoubtedly, rare, but there is reason to suppose, that the mucous membrane of the bladder, ureters, and pelvis of the kidneys may occasionally take on the same morbid action as the lining of the respiratory and alimentary tubes, and give rise to exhalations of blood from their surface.

The extreme rarity of idiopathic hæmaturia cannot be more forcibly expressed than by stating, that that accurate observer of diseases, Dr. Cullen,

doubted of the existence of idiopathic hæmaturia. Frank, also, informs his readers, that out of 4000 patients treated by him in the clinical wards of the Hospital of Pavia, he had only observed six cases of spontaneous hæmaturia. (*De. Cur. Hom. Morbis*, vol. i., pt. ii., p. 256.) Of the annual average of 4000 out-patients treated by the writer at St. Bartholomew's Hospital, not more than one or two cases of idiopathic hæmaturia have been met with.

However rare such cases may be, all the best writers on this subject admit the existence of hæmaturia independent of structural disease of the urinary organs. Dr. Watson states (*Med. Gaz.*, vol. x., p. 469), that renal hæmorrhage may occur independent of any discernible disease or change of texture in the kidneys themselves. It sometimes appears to be the consequence of a determination of blood to those organs, taking place without any obvious or intelligible cause.

Dr. Willis maintains the opinion, that hæmaturia does appear now and then with all the characters of a peculiar and independent affection, and that he had recently met with a case which he regarded as idiopathic, and viewed as though the discharge of blood constituted the sum of the affection. (*On Urinary Diseases*, p. 176.) Andral, also, admits the existence of hæmaturia depending wholly on constitutional causes. (*Précis d'Anat. Path.*, vol. i., p. 339.)

The disease sometimes presents all the characters of an active constitutional hæmorrhage : it is also met with as a passive hæmorrhage, or it may appear as supplemental or vicarious of other natural or habitual discharges of blood.

With respect to the treatment of cases of active exhalation of blood from the urinary organs without discoverable disease, nothing more can be suggested than to pursue the plan which has been already recommended for other active constitutional hæmorrhages.

A much more alarming form of hæmaturia is that which bears the character of a passive constitutional hæmorrhage, and which occurs in the progress of those diseases which affect the system at large, especially scorbutus and purpura hæmorrhagica. Such cases generally terminate fatally. Andral states that he was in attendance upon an old woman suffering from a cancerous affection of the stomach, and that, a fortnight before her death, numerous purpurous spots appeared upon the skin, and at the same time a notable quantity of blood escaped daily with her urine. After death purpurous spots were found on the pleura, peritoneum, in the alimentary canal, and on the lining of the heart. A bloody fluid filled the pelvis and ureter of each kidney, and when the tubular portions were pressed, a similar fluid exuded. A liquid dark blood was found in the heart and great blood-vessels, and without any appearance of coagulation.

Hæmaturia appears also, though rarely, as a passive hæmorrhage in the course of typhus fever, malignant small pox, measles, scarlet fever, and plague. In these diseases it is to be regarded as a fatal symptom.

When bloody urine is voided in the course of these several constitutional affections, the mere hæmorrhage from the urinary organs is not so much the symptom to be combated, as the general condition on which it depends. The treatment, therefore, of the hæmaturia is wholly absorbed in that most suitable for the general constitutional disturbance.

When hæmaturia appears as a vicarious hæmorrhage supplemental of hæmorrhoidal or menstrual discharge, the blood is generally effused from the inner coat of the bladder. In obstinate cases of hæmaturia, and particularly when it recurs from time to time, inquiry should be made as to previous hæmorrhages from the rectum, and in females, as to the state of the catamenial function. Some modern French writers on this subject state that elderly females sometimes pass bloody urine in considerable quantity at intervals, after the complete disappearance of the catamenia. One of these writers had under his care an elderly woman whose general health was good, but who passed a considerable quantity of blood with her urine nearly every month. This hæmorrhage was preceded

by heat and uneasiness in the hypogastric region, some general indisposition, with headache; these symptoms vanished as soon as the hæmaturia commenced, and she remained perfectly well, in spite of every active habits of life, until the expiration of the usual period. (*Dict. de Méd. et Chir. Prat.* art HEMATURIE.)

In such cases the object of treatment is to restore, if possible, the suppressed hæmorrhage: this is often a difficult undertaking, because the means to be employed sometimes increase the discharge of blood from the urinary passages. The oil of turpentine, the tincture of cantharides, or the muriated tincture of iron, employed cautiously and in very small doses, will be found most efficacious in controlling the hæmorrhage. When there is local pain or irritation, sedatives, as, for example, the uva ursi, opium and warm baths are of service.

Lastly, hæmaturia frequently arises from morbid conditions of the urinary organs themselves. There are several diseased conditions of the kidney under the influence of which blood is poured out from that organ and mixed with the urinary secretion.

In inflammatory dropsy with albuminous urine, and in that form of dropsy which supervenes during the convalescence from scarlet fever, it is by no means uncommon to observe a certain quantity of blood, or its colouring and albuminous principles, excreted with the urine. When such cases terminate fatally the kidneys are usually found intensely congested with blood. Again, blood is sometimes mixed with the urine in inflammation of the kidney, and likewise during the progress of carcinomatous or other malignant degeneration of its substance; but a much more frequent cause of renal hæmorrhage is the irritation occasioned by the formation of a calculus in the pelvis of the kidney. The irritation produced by the constant growth of the calculus will excite intense congestion of the surrounding mucous membrane, which relieves itself by the exhalation of blood: at other times, the enlargement of the calculus or its change of position causes laceration or ulceration of the surrounding highly vascular parts. The calculus, in its descent to the bladder, may in a similar manner excite hæmorrhage from the lining of the ureter.

Hæmaturia may be the consequence of some morbid state of the urinary bladder. A calculus may have descended from the kidney into this viscus, or it may have had its commencement there: under either circumstance, it may occasion hæmorrhage from the mucous surface of the bladder.

Inflammation of the mucous membrane of the bladder is another cause of the appearance of blood in the urine. This affection sometimes appears almost as an epidemic, and especially in hot climates. M. Renoult has described a troublesome and obstinate hæmaturia which affected numbers of the French troops in Egypt, and particularly the cavalry. It was attended with much pain in the region of the bladder, extending along the urethra to the extremity of the glans penis, with a frequent and urgent inclination to pass urine. The last drops voided consisted often of pure blood, and their expulsion was accompanied by acute pain. Several of these men died and on dissection the mucous membrane of the bladder was found inflamed. The same disease appeared among the horses. (*Dict. de Méd.*, vol. ix. art. HEMATURIE.) Similar affections occur to couriers and others who perform long and rapid journeys on horseback. The diagnoses of the seat of hæmorrhage is easy, and the treatment is involved in that which is appropriate for the cystitis. Chronic disease of the mucous membrane of the bladder, whether simply inflammatory or of a malignant nature, will give rise to occasional hæmorrhage from its surface. In some of these cases, only a small quantity of blood, mixed with puriform mucus, passes after the urine is voided; in others the quantity of blood poured out is very considerable, and produces serious inconvenience. A case of this latter description occurred to the late Mr. Heaviside. An old East Indian, who had long been subject to nephritic complaints was suddenly seized with symptoms resembling retention of urine. A catheter was passed, but as no urine flowed, it was sup-

posed that the instrument had not entered the bladder, in which region there was a manifest tumour. The patient died the next day, and the bladder was found distended by a very large coagulum of blood, which had come from its diseased mucous membrane. There was no trace of escape of blood within the kidneys or ureters.

The treatment of Hæmaturia has not been detailed at any length, because it has been our object to show that when it occurs as an idiopathic hæmorrhage the attention is to be directed to the state of the constitution ; and where it is a symptom of a morbid condition of the urinary organs, it will be most success-fully combated by judicious management of the local affection on which it depends.

HÆMORRHAGE FROM THE UTERUS.

Definition.—Active and passive menorrhagia.—Symptoms and treatment.—Occurring during pregnancy and parturition.—Causes and treatment.—Resulting from structural diseases of the uterus.

THE periodical escape of a bloody fluid from the vessels of the uterus is an indi-cation of a healthy and robust constitution. When it is limited to a certain quantity, varying from two to six ounces in different individuals and climates, and recurring every lunar month, for about thirty years after the age of puberty, in the unmarried female, it cannot be regarded as a pathological phenomenon, but constitutes natural menstruation, the healthy function of the unimpregnated uterus. When, however, the natural menstrual fluid is excessive in quantity, or when blood escapes from the gravid uterus, or where it flows in large quan-tities from that organ immediately after parturition, or when the substance of the organ is diseased, the affection is termed uterine hæmorrhage, the various forms of which we shall briefly advert to.

That variety of uterine hæmorrhage which is termed menorrhagia consists in a morbidly profuse menstruation, and may occur in very opposite states of the system. It may present itself either as an active or passive hæmorrhage. In active menorrhagia, for a few days before the expected menstrual period, there is a sensation of unusual fulness about the pelvis, with throbbing sense of heat and weight referred to the situation of the uterus ; the external organs of gene-ration are often slightly swollen, and the mammæ become hot, tumid, and tender ; the pulse is accelerated, the mouth hot, the tongue dry ; the patient is thirsty, and there is a general feeling of oppression, with headache and giddi-ness. The discharge from the commencement comes on with violence, often in gushes of pure blood, as is proved by its coagulation, and the pain experienced from the passage of the coagula. Sometimes, after the first few hours, the woman feels relieved, lighter and cooler ; and the rest of the period proceeds' as in healthy menstruation. In more aggravated cases, the flow still proceeds in equal or increased quantity, and lasts for several days, occasionally inter-mitting, but again bursting forth upon the slightest exertion, till at the end of the period she is left weak and languid, with a feeble pulse and pallid counte-nance.

Before the recurrence of the next monthly period she has perhaps recovered her wonted health ; but the same series of symptoms returns, perhaps with some aggravation, particularly with a longer continuance of the discharge. In this manner one period has scarcely terminated before another commences, and the most strong and plethoric woman is brought down to a state of great weakness,

and the disposition to hæmorrhage continuing, active menorrhagia may thus lapse into passive hæmorrhage.

In passive menorrhagia the female is usually delicate, with feeble constitutional powers, or has become so from repeated losses of blood in the more active form of the disease. She has a frequent circulation; the heart is easily excited to overaction: she suffers from violent headaches, with throbbing of the temporal arteries, singing in the ears, and giddiness, symptoms arising not from general plethora but from exhaustion and unequal distribution of blood. In passive menorrhagia there are seldom any premonitory symptoms; if the menstrual periods are still regular as to time, they are unnatural as to duration and the quantity of blood lost : they are generally, however, too frequent, and there is scarcely any cessation of the discharge. When the gushes of blood have stopped, they are succeeded by a constant oozing of a thin serous fluid; and when the catamenia have ceased, a profuse leucorrhœal discharge takes place : slight bodily exertion or mental excitement brings on a return of the sanguineous discharge. The usual constitutional effects of repeated loss of blood are at last induced, and the person exhibits the well-known appearance of confirmed anæmia. The danger of passive menorrhagia is not merely confined to the serious constitutional effects just adverted to ; the discharge may be so sudden and profuse as to bring on alarming syncope. Another evil consequence of continued menorrhagia has been remarked in the tendency of such women to profuse losses of blood after abortion or parturition at the full time. Females who are naturally plethoric are disposed to active menorrhagia ; in such cases it is often a natural mode of relieving the over-distended vessels : this tendency is aggravated by luxurious habits, a sedentary and indolent life, and inattention to the regular and free action of the bowels. All those causes which tend to lower the constitutional powers dispose to passive menorrhagia ; but there certainly are delicate females in whom from early life there seems to be a superabundant or undue distribution of blood to the uterus, and who, under the influence of certain exciting causes, are almost sure to suffer from passive menorrhagia.

The principal exciting causes which peculiarly attend to increase the activity of the circulation through the uterine system, and thus bring on menorrhagia, are violent exertion or fatigue in the erect posture, just prior to the appearance of the catamenia ; blows, falls, or any other local violence ; frequent abortions ; over-indulgence in sexual intercourse, particularly before the period has entirely passed over ; irritation in the rectum or bladder, &c. The treatment of menorrhagia must mainly depend upon the nature of the hæmorrhage, and the exciting causes which have brought on the discharge.

Where the menorrhagia still bears an active character in a robust and plethoric female, we may abstract a moderate quantity of blood by venesection : and in those cases which are accompanied by much pain in the loins and pelvis, great relief will be obtained by the abstraction of six or eight ounces of blood by cupping from the sacrum. The patient should be kept at perfect rest in the horizontal posture, the body covered with light clothing, and cold applied to the lower parts of the body ; cold water may be dashed from time to time over the hypogastrium or loins, and ice-cold applications laid over the pubes and perineum.

When the discharge is so excessive that much additional loss of blood might be attended with danger, we may resort to a very effectual method of restraining the hæmorrhage, viz., plugging the vagina, according to the directions of Dr. Locock in his paper on menorrhagia :—" A fine cambric handkerchief may be gradually introduced into the vagina up to the os uteri, so as to fill the vagina firmly throughout its whole extent, and be allowed to remain there. Many prefer soaking it previously in some strong astringent liquid, and this is perhaps still more efficacious. If the plug produce pain, it must be withdrawn ; and, at all events, it should not be allowed to remain more than twenty-four hours. On withdrawing it, unless it be done very gently and gradually, a fresh discharge of

blood is apt to be occasioned : but it can easily be restrained by another plug, or some of the other remedies." (*Cyc. Pract. Med.*)   Of the internal remedies for restraining uterine hæmorrhage when it is excessive and of the active kind, we have nothing further to suggest than those which have been recommended in all active constitutional hæmorrhages.

In passive menorrhagia occurring, in feeble constitutions, or in those reduced by a long continuance of the disease in an active form, besides the topical remedies for the actual repression of the hæmorrhage, we must endeavour, in the intervals between the periods, to restore tone to the vessels of the uterus ; and to strengthen the general health.   To accomplish the former object, cold bathing, the cold hip bath, and sponging the body with cold vinegar and water, will be found of great use.   These should be employed daily, and a cold astringent injection may be thrown up into the vagina every morning.

The various mineral tonics and astringents, judiciously administered, will be found eminently serviceable in cases of passive menorrhagia.   The salts of iron and zinc are those upon which most reliance may be placed, and the former are particularly efficacious, when taken in the minute quantities in which they are found in many natural mineral springs.   Dr. Locock has also found the Liq. Potass. Arsenitis, in doses of five drops, gradually increased to twenty-five, of great service in some cases of menorrhagia of the atonic character.   The other rules for the improvement of general health will be the same in this as in other forms of passive hæmorrhage.

Uterine hæmorrhage may occur during pregnancy ; this accident may happen in the early or in the more advanced stage of utero-gestation.   When uterine hæmorrhage occurs at the early period of pregnancy, it is occasioned by the partial separation of the placenta from the uterus, and the probability of arresting the hæmorrhage and preventing abortion will depend upon the extent to which the detachment of the placenta has proceeded.   The further practical consideration of this variety of uterine hæmorrhage will be more conveniently entered upon, where the causes and treatment of abortion are discussed.   When uterine hæmorrhage does not make its appearance until the fifth month of pregnancy, it is usually a much more formidable accident, and commonly arises from malposition of the placenta near the mouth of the uterus.   It appears without any obvious cause, and subsides after some precautions have been adopted, but again appears more profusely, continues longer, and does not yield to the former treatment.   This variety of uterine hæmorrhage generally goes on increasing until the fœtus dies, or premature delivery is accomplished.   The quantities of blood lost are sometimes so considerable as to endanger the life of the mother ; or, if she escape with her life, she is reduced to a state of complete anæmia, and is harassed with the distressing train of symptoms with which it is accompanied.

The various means to be resorted to for controlling this form of uterine hæmorrhage, and the indications which should induce the practitioner to bring on premature delivery, are more appropriately considered in treatises on midwifery.

When such an amount of blood is lost during parturition as to entitle it to be called a hæmorrhage, it may occur either at the commencement or at the termination of that process.   When the hæmorrhage comes on at an early stage of labour, it is usually from the attachment of the placenta near the mouth of the uterus, or from its partial separation from unequal contractions of the uterus.   In rarer cases it may proceed from laceration of some part of the substance of the uterus, or from rupture of the umbilical cord.   When the hæmorrhage comes on towards the termination of labour, after the expulsion of the fœtus, it appears to arise either from imperfect separation of the placenta, connected with irregular or spasmodic contraction of the uterus, or from torpidity and imperfect contraction of the womb after the expulsion of the placenta.   If uterine hæmorrhage occur at the termination of labour from either of the above-mentioned causes,

the blood may either escape through the vagina or remain confined within the uterus. The former is readily indicated by the profuse flooding, but the latter may not be detected until the woman is falling into fatal syncope, when the uterus is found distended almost to the size it was before delivery. It is obvious that this internal hæmorrhage is of a most formidable nature, from the insidious manner in which it goes on to an almost fatal extent. We shall content ourselves with having pointed out these varieties of uterine hæmorrhage, and the causes which apparently give rise to them, referring for more ample details, and the requisite treatment, to treaties on midwifery.

The last form of uterine hæmorrhage which we propose to consider is that which is independent of menstruation, pregnancy, or parturition, and which may be properly termed *symptomatic*, arising from some structural disease in the uterus itself.

Hæmorrhage from the uterus sometimes occurs as a critical evacuation in the course of uterine inflammation, but the most frequent morbid condition of the uterus, which gives rise to repeated attacks of hæmorrhage, is the developement of some morbid growth within its cavity. These formations are tumours of various kinds, either in the muscular walls of the organ, or immediately beneath the internal lining ; polypous growths, moles, carcinoma, and destructive ulcerations.

The presence of any of the above-described morbid formations in the uterus has a tendency to excite undue activity in the circulation of the organ. If they form during that period of life when the woman should menstruate, their existence may perhaps be indicated by no other symptoms than profuse and painful menstruation, followed by occasional leucorrhœa. Many of the most severe and obstinate cases of menorrhagia are dependent upon some fibrous tumour or polypous growth in the uterus, and such cases progress from bad to worse, unless the exciting cause is detected. The only permanent cure for interior hæmorrhage of this kind is by surgical operation.

Uterine hæmorrhage sometimes comes on and continues for a short time after the cessation of the catamenia. When this appears only once or twice, it readily yields to remedies which diminish plethora and equalize the circulation ; but when uterine hæmorrhage occurs to any extent after the cessation of the catamenia, and recurs from time to time, particularly if the woman is approaching her fiftieth year, there is just cause of alarm that this hæmorrhage is symptomatic of serious structural disease of the uterus.

It is the opinion of Louis and some able pathologists, that hæmorrhage from the uterus and other organs is one of the most constant symptoms of malignant formations. The frequent recurrence of uterine hæmorrhage in a woman of middle age should at once excite the suspicion of structural disease in that organ, and induce the practitioner to institute a careful manual examination of its condition. Women themselves are sometimes apt to imagine, that the discharge of blood is only a return of the catamenia ; but symptomatic hæmorrhage may be distinguished from the catamenial by the character of the discharge, by the irregularity of the periods, by its longer continuance, and by the succession of leucorrhœa to the bloody fluid.

Although this form of hæmorrhage is only a symptom of structural disease, still it often requires more serious attention for the time than the disease on which it depends. Its frequent recurrence and the consequent anæmia demand immediate relief. For this purpose the various remedies suggested to control the different forms of menorrhagia will be applicable, but the only permanent relief to be anticipated must be through a judicious treatment of the structural disease of the uterus.

SCURVY.

THE English word *scurvy*, anciently *scorbie*, is of Saxon origin, and evidently derived from the same root as the vernacular names of the disease among the other nations of the Saxon race; namely, in the German language *scharbock*, which signifies a griping, or tearing of the belly; in the Dutch *scheurbuik*; in the Swedish *skörbjugg*; and in the Danish *skörbug*. The medical term *scorbutus* appears to be merely a latinized variation of the last of these.

This disease was endemic two centuries ago, in all the northern countries of Europe. It became gradually less frequent as agriculture and gardening improved; and we have witnessed the almost complete extinction of scurvy *on land*, as the influence of these arts has extended to the almost remote parts of Europe and to the humblest classes. It seems to have been very imperfectly, if at all known to the Greek, Roman, and Arabian physicians. Some passages in the writings of Hippocrates have, indeed, led to the supposition that he was acquainted with this disease; but those passages, if they refer to scurvy, are extremely vague, and show, at least, that his acquaintance with it was very slight, and that he had not learned to distinguish it from other diseases of different nature.

The Greek and Roman physicians, subsequent to Hippocrates, either copy his descriptions, or make no mention of any group of symptoms that can be supposed to refer to scurvy. It is probable, indeed, that they seldom met with instances of it, which must have been very rare among them, on account of the abundance of fruits and vegetables in their climate, and the shortness of their coasting voyages; a circumstance unfavourable to its occurrence at sea. They were also little acquainted with the northern countries, where it must then, as since, have prevailed.

The earliest unequivocal description of scurvy is to be found in the narrative of the campaign of the Christian army in Egypt under Louis IX., about the year 1260. The historian of that crusade was not only eye-witness of the disease in others, but was himself affected with it. He speaks of the debility and tendency to swoon, black spots on the legs, bleeding from the nose, and the livid and spongy condition of the gums. With respect to the last-mentioned symptom, he says, " The barbers were forced to cut away very large pieces of flesh from the gums, to enable their patients to eat. It was pitiful to hear the cries and groans of those on whom this operation was performing; they seemed like the cries of women in labour." The disease showed itself in Lent, during which the soldiers, in compliance with the ordinances of their religion, ate no meat, and they had only one sort of fish, the *bombette*; this circumstance, together with bad air and great scarcity of water, was supposed to have brought

on the disease. (*Histoire de Louis IX. par le Sieur Joinville, Trans.*, vol. i., p. 162.)

Scurvy has, unquestionably, existed in the north of Europe from the most remote antiquity. That we have no mention of it in the early history of the northern nations must be imputed to the extreme ignorance of the people, especially as regards medicine; but about the commencement of the sixteenth century, when they began to cultivate letters, we find accurate descriptions of this disease, which is frequently mentioned by their historians and other authors. Olaus Magnus, in his history of the northern nations, published in 1555, when speaking of the diseases peculiar to those nations, gives a particular description of scurvy, which, he tells us, infested chiefly soldiers in camps and persons shut up in prisons or besieged towns. About the same time we find three physicians, Roussens, Ecthius, and Wierus, expressly treating of this disease. Their descriptions of its symptoms are very accurate, and they recommend those remedies which are found, at present, the most efficacious.

In 1645 the Faculty of Medicine at Copenhagen, in Denmark, published a *consilium* for the benefit of the poor in that country. This *consilium* treats of the causes, prevention, and cure of scurvy. We learn from it that scurvy was at that time prevalent among the Danes and other northern nations. (*Consilium Medicæ Facultatis Hafniensis de Scorbuto.* Lind, p. 353.)

It appears by a letter from Linnæus to Dr. Lind, dated 1755, that scurvy was, at that time, common on the borders of the Baltic among peasants, artificers in iron, and miners. (*Lind*, p. 283.) It was prevalent also in several parts of Scotland, where it was popularly known by the name of *black legs*. Dr. Grainger, in answer to some inquiries by Dr. Lind, says that it has often been very epidemic and fatal to the miners at Strontian, in Argylshire.

Dr. Huxham, in a letter to Dr. Lind, says that scurvy was at that time endemic in some seaport towns of Devonshire and Cornwall. He remarks that it was most common in fishermen and tradesmen, and seldom met with in agricultural labourers, who drink cider and eat plentifully of vegetables and fruits.

All the writers from whom the preceding accounts are derived, agree in stating that the latter part of winter and the early part of spring was the season in which scurvy prevailed most; and that it uniformly disappeared during summer and autumn.

The causes which in the middle of last century had rendered scurvy less frequent on land than previously have continued to operate with increasing efficiency; so that at present, except under peculiar circumstances, the disease is never met with in England, and, we believe, very rarely in any of the northern countries of Europe. That it should, a century or two ago, have been endemic in many parts of England seems almost incredible, when we consider the circumstances under which it arises, and the present aspect of this country; but we have undeniable evidence of the fact, and it affords proof of the extraordinary change which a few centuries have wrought in the cultivation of the soil, and in the habits of the people, especially with reference to the increased consumption of vegetable food. This is confirmed by the historical fact that, until the commencement of the sixteenth century, no salads, carrots, turnips, or other edible roots were grown in England. The little of these vegetables that was used before that time was imported from Holland and Flanders; and in the reign of Henry VIII. Queen Catherine, when she wanted a salad, was obliged to despatch a messenger thither on purpose.*

But although, two centuries ago, scurvy was endemic in the northern countries of Europe during the spring of every year, it was in seasons of scarcity, or when its usual causes were strengthened by the desolation of war, and during long sieges, that its ravages were principally felt.

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* Hume, *Hist. of England*, vol. iv. p. 241; see also, art. GOUT, in this work.

During the siege of Breda, in North Brabant, by the Spaniards, in 1625, the inhabitants and garrison were dreadfully afflicted with scurvy : on the 16th of March, when an account was taken of the sick, 1608 soldiers were found affected with this disease ; and the number afterwards increased daily. The town was surrendered in June, after a siege of eight months. (*Frederic Van-der Mye, De Morbis, Bredanis.*)

J. F. Backstrom, in an essay, published in 1734, which is replete with just observations on the causes, nature, and treatment of scurvy, informs us that in 1703, during the siege of Thorn, in Prussia, by the Swedes, which lasted only five months, and was carried on during the heat of summer, 5000 of the garrison, besides a great number of the inhabitants, died of this distemper. The besiegers were, at the same time, quite free from it. (*Haller, Disput. ad Morbos,* vi.)

In 1720, during the war between the Austrians and Turks, when the imperial army wintered in Hungary, many thousands of the common soldiers (but not one officer,) were cut off by scurvy. Dr. Kramer, a physician to the army, being unacquainted with a remedy for it, requested a consultation of the college of physicians at Vienna. Their prescriptions and advice were, however, of no avail : the disease, which broke out at the end of the winter, persisted until, at the approach of summer, the earth became covered with greens and vegetables. (*Haller, Disput. ad Morbos,* vi.)

In the early part of the last century scurvy was also very common, and very fatal in the Russian armies. (*A Treatise on Scurvy, as it appeared in the Russian Armies:* by A. Nitzch, 1747. See *Lind,* p. 415.)

In the spring of 1760, scurvy prevailed to a great extent among the English that formed the garrison at Quebec, which had been taken from the French the preceding year. These troops, at first 6000 men, suffered so much from cold and want of vegetables and fresh provisions, that before the end of April, 1000 of them were dead of scurvy, and twice that number unfit for service. (*Smollett's Hist. of Eng.*, vol. v., p. 198.)

But instances of armies being much weakened by scurvy, have occurred more recently, and among a people, who, by reason of their climate, which is favourable to the growth of vegetables and fruits, have enjoyed comparative impunity from that disease. In the spring of 1795, scurvy was very general among the French soldiers in the army of the Alps. Fodéré, who was physician to the army, informs us that he treated between seven and eight hundred soldiers affected with it. In 1801, during the siege of Alexandria, it prevailed among the inhabitants and garrison to a most frightful extent. During the siege which was commenced by the English in May, and which lasted only till the end of August, 3500 scorbutic patients were received into the military hospitals, which the French established in that city. (*Mém. de Chir. Milit. de D. J. Larrey,* Paris, 1812, tom. ii.)

In late years, scurvy has shown itself occasionally in our armies in India, as well as in some public establishments in that country ;[*] and in the autumn of 1836, it prevailed to a great extent among our troops, stationed in the new province of Queen Adelaide, at the Cape of Good Hope. The disease first appeared about the end of July, and continued to prevail from that time to December, a season corresponding to spring in the northern hemisphere. None of the officers were affected with it. The men had no harassing duties, and were abundantly supplied with good fresh meat, without having had an ounce of salt provisions ; but they had been a long time without fruit or fresh vegetables. In all these circumstances, we find perfect agreement with some accounts left us of the occurrence of scurvy in the continental armies in the early part of the last century.[†]

[*] Med. and Phys. Trans. of Calcutta, vols. iii., iv., vii., and viii.; and the Quarterly Journal of the Med. and Phys. Society of Calcutta, vol. i. p. 306.

[†] See Med. Gazette, vol. xx. Extract from the annual report of Dr. Murray, principal medical officer at the Cape of Good Hope.

But it is not only in armies and during sieges, that we meet with even modern instances of the occurrence of scurvy on land. From the earliest times, it has appeared occasionally in persons long confined in prisons and asylums; and an instance of its prevailing extensively, under such circumstances, happened in England so recently as in the year 1823. We allude to the disease which prevailed in the spring of that year among the inmates of the Milbank Penitentiary. The description of this disease, by Dr. Latham, shows that it was scurvy in conjunction with dysentery and other effects of starvation. This complicated malady was occasioned by a diet, of which fresh succulent vegetables formed no part, and the quantity and quality of which were not adequate to the support of health.*

The reports of the inspectors of prisons, for the years 1836, 1837, 1838, abound with instances of the occurrence of scurvy in our gaols and prisons. In 1836 it assumed a very malignant form in the county gaol at Norwich; not fewer than eighteen persons were severely affected with it. (*First Report of Inspectors of Prisons; Northern Division*, p. 39.) In the House of Correction at Swaffham, as appears by the report of the surgeon, the prisoners frequently lost their teeth from the effects of scurvy; and when they were examined (1836) in presence of the inspector, sixteen were found presenting its early symptoms.† (*Ibid.*, p. 49.)

In most of the instances mentioned in these reports, it appeared in prisoners who had been some months in confinement; and originated in a circumstance already specified, namely, prolonged use of a diet of which fresh succulent vegetables formed no part.

We have said that notices of scurvy, as a disease peculiar to the northern nations of Europe, became frequent as soon as they began to cultivate letters; but two other circumstances, which happened about the same time, tended powerfully to direct men's minds to the consideration of this disease, and, by exhibiting it in an isolated manner, to give them precise ideas respecting it. We allude to the frequent performance of long voyages at sea, and to the establishment of colonies in the northern part of the newly-discovered continent of America.

The early northern colonies in America were dreadfully afflicted with scurvy. The French, especially upon first planting Canada, experienced such loss from the mortality it occasioned in winter, that they often had thoughts of abandoning their settlement. The same was the case with the English, on their settling in Newfoundland. The adventurers who first wintered in Hudson's Bay, were almost all destroyed by scurvy; and, after many unsuccessful trials, it was deemed impracticable to pass the winter in those parts.

As early as the middle of last century, however, the persons employed in our factories at Hudson's bay, enjoyed extraordinary health, and were entirely exempt from scurvy; a circumstance which has been ascribed to the use of spruce-beer, which they had adopted as a common beverage.

But it is during long voyages that the ravages of scurvy have been most felt, and the existence of it, as a prevalent disease maintained.

The earliest account of the occurrence of scurvy at sea is to be met with in the narrative of Vasco de Gama, who first discovered a passage to the East Indies by the Cape of Good Hope, in the year 1497; about a hundred of his men, out of a hundred and sixty, died of this distemper.‡

The narratives of subsequent navigators, especially Cartier, Drake, Cavendish, and Dampier, abound with descriptions of the frightful ravages of scurvy.

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* Scurvy showed itself in some of the prisoners soon after Christmas, and became very general in the month of February. The winter was very severe.

† For other instances, see First Report, 1836, No. 2, p. 55, 60, 63, 85, &c.; Second Report, 1837, No. 1, p. 81, 217, 232, &c.; Third Report, 1838, No. 2, p. 81, No. 3, p. 79, &c.

‡ V. de Gama sailed on the 8th of July, 1497, and returned to Lisbon in the month of September 1499, more than two years after his departure.

In the account of the second voyage of Cartier to Newfoundland, in 1535,* there is a very graphic description of the disease, which showed itself in his men soon after Christmas, and which he ascribed to their intercourse with the natives who were at that time affected with it. The following passage will give some idea of the sufferings it occasioned :—" With such infection did the sickness spread in our three ships, that about the middle of February, of a hundred and ten persons that we were, there were not ten whole ; so that one could not help the other ; a most horrible and pitiful case. Eight were already dead, and more than fifty sick, and, as we thought, past all hope of recovery. This malady being unknown to us, the body of one of our men was opened, to see if by any means possible the occasion of it might be discovered, and the rest of us preserved. But in such sort did the sickness continue and increase, that by the middle of March there were not above three sound men left. Twenty-five of our best men had died, and all the rest were so ill that we thought they would never recover again ; when it pleased God to cast his pitiful eye upon us, and send us knowledge of a remedy for our health and recovery." (*Hakluyt's Collection of Voyages*, vol. iii.).

The remedy alluded to was a decoction of the bark and leaves of a tree, called by the natives, *Ameda*, or *Hanneda*, by the use of which they were all perfectly restored in a short time.

In the first voyage for the establishment of the East India Company, the equipment, consisting of four ships with 480 men, under Commodore Lancaster, sailed from England on the 2d of April, 1600. The crews of three of these ships were so weakened by scurvy, by the time they had got only three degrees beyond the line, that the merchants who had embarked on this adventure were obliged to do duty as common sailors. On the 1st of August, when they arrived at Saldanha, near the Cape of Good Hope, the commodore's own ship was in perfect health, from his having given three table-spoonsful of lemon juice every morning to each of his men ; while the other ships were so sickly that the commodore was obliged to send men on board to take in their sails and hoist out their boats ; and there died, at sea and on shore at Saldanha, 105 men, nearly one-fourth of their whole number. (*Purchas's Collection of Voyages*, vol. i.)

The memorable expedition of Lord Anson in 1740, and the four following years,† offers another example of the mortality formerly occasioned by scurvy during long voyages. At the end of two years from their leaving England, the vessels engaged in the expedition had lost, from this disease, a larger proportion than four in five of the original number of their crews.

It is gratifying to turn from the descriptions of sufferings undergone in the voyages of earlier navigators, to the narrative of Captain Cook, who in 1772, 3, 4, and 5,‡ in the *Resolution*, with a company of 118 men, performed a voyage of three years and eighteen days, in all climates, from 52° north to 71° south, with the loss of only one of his crew by disease.

It is to the sagacity of this extraordinary man that we are indebted for the first impulse towards those improvements in the treatment of sailors by which scurvy is at present so effectually prevented in our navy.

In 1780 scurvy was very prevalent in the channel fleet. In the month of August the squadron under Admiral Geary, after a cruise of ten weeks in the Bay of Biscay, returned to Portsmouth with 2400 men affected with it. During the same year and the following, scurvy prevailed also to a great extent in our fleet, under Lord Rodney, in the West Indies ; it was, however, much mitigated by improvements which were then introduced, chiefly at the suggestion of Sir

* Cartier sailed from St. Malo on the 19th of May, 1535, and arrived at Newfoundland on the 7th of July. He spent the autumn in exploring the coast and the river St. Lawrence, which was discovered by him.

† Lord Anson left England in September, 1740, and returned in June, 1744.

‡ Captain Cook sailed from Plymouth on the 13th of July, 1772.

Gilbert Blane, into the victualling of the fleet. From this time scurvy was much less prevalent than before, but in the spring of 1795 it broke out in the Channel fleet under the command of Lord Howe, to such an extent as to endanger the safety of the whole fleet. Its uncommon violence was owing to the following circumstances. The winter had been extremely severe, and all vegetation was destroyed in the neighbourhood of Portsmouth, so that no vegetables could be procured, or they could be procured only at a price which put them out of reach of the sailor; beef, too, had much risen in price, and the Victualling Board had, in consequence, allowed fresh meat only one day a week. In the beginning of April, scurvy made its appearance, and soon after pervaded every ship. To suppress it, became, of course, an object of great national importance, and every effort was made by the commissioners of the Admiralty for the accomplishment of this purpose. Fresh meat, together with a plentiful supply of oranges and lemons, was granted. Vegetables at first could be procured only in small quantities; as the season advanced, they became more plentiful, and after the 31st of May, 5000 weight of salad was distributed daily among the ships at Spithead. The good effects of these refreshments were astonishing; on the 12th of June the squadron sailed again in good health. (See an admirable account of the health of the fleet in *Trotter's Medicina Nautica*.)

It was in the course of this year that an admiralty order was first given for furnishing the navy with a regular supply of lemon juice, which had been long known to be a remedy for scurvy, and which some recent experiments had proved to be equally efficacious in preventing it. From this time we may date the extinction of scurvy in the British navy. It has, indeed, shown itself on several occasions since, especially in some of the expeditions for the discovery of a north-west passage; but it has prevailed only in a slight degree, and has almost always been suppressed by an additional allowance of lemon juice.

This happy result is far, however, from being realized in the commercial marine of this country. The means, which experience has proved to be of such certain efficacy, and which are so easy of adoption, are in many instances neglected: in proof of this we need only mention, that in the space of a year and a half, during which we have been physician to the Seamen's Hospital, Dreadnought, we have had to treat nearly fifty cases of scurvy; and from information obtained from these patients, are led to estimate the number of sailors who entered the port of London affected with scurvy during this period, at not less than double that number. The wretched condition of some of these men has convinced us that the descriptions of the sufferings occasioned by scurvy in voyages of the early navigators have not been exaggerated.

All the cases that have fallen under our observation, with the exception of four, occurred in sailors who had come from the Mauritius, Sidney, Ceylon, China, or some port in India; of these four, two happened in the spring of the present year (1838), in Russian sailors belonging to two different vessels, each of which had been several months in the Thames;* one, in a sailor who came last from the West Indies; and the fourth, in a sailor recently arrived from the coast of Spain.

We have no data for forming an accurate estimate of the mortality occasioned by scurvy before preventive measures were generally adopted. It has been

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* One of these men was admitted on the 2d, the other on the 15th of March. The winter had been uncommonly severe. The diet of one of them consisted of black rye bread and Russian butter, with tea, mornings and evenings; and for dinner, one pound of salt beef, with boiled pearl barley, two days; one pound of Russian pork, with peasoup, three days a week; dry stock fish, with flour pudding on Saturdays; one pound of fresh meat, with barley soup, on Sundays. A small glass of brandy daily, but no beer or vinegar. The diet of the other had been nearly the same; in fact, this is the general diet of Russian sailors in merchant ships; the only variation being in the relative number of beef and pork days. On referring to the registers of the *Dreadnought* for former years, I find other instances of Russian sailors, engaged in the trade between Russia and this country, admitted for scurvy during the spring months.

supposed, however, to have destroyed more sailors than the other various accidents incidental to a sea-life, together with the terrific consequences of naval warfare; and history furnishes us with many examples, which tend to show that in this estimate the destructive effects of it have not been overrated.

Sir R. Hawkins, who lived in the latter part of the sixteenth century, and whose description of this disease shows that he was well acquainted with it, informs us that he could give an account of ten thousand mariners, consumed by scurvy alone, in twenty years that he had been at sea.*

Admiral Hosier, who set sail in the month of April, 1726, with seven ships of the line for the West Indies, buried his ships' companies twice, and died himself of a broken heart in consequence.

We are told by Dr. Lind that during the war which terminated in 1748 in the peace of Aix-la-Chapelle, scurvy proved more destructive, and cut off a greater number of valuable lives than the united efforts of the French and Spanish arms. (*Lind*, Preface, p. 5.)

But the most striking illustration of the dreadful effects of scurvy in former times is the contrast, in point of health, which our present navy offers with the fleets of this country before effectual remedies were resorted to. The mortality in the navy had been gradually decreasing since 1780, when various improvements were made in the victualling of the fleet and in the general treatment of the men; but in 1795, when a regular supply of lemon juice was first granted, the mortality fell *suddenly*, and to a degree scarcely credible. The effect of all these salutary measures may be estimated by the fact mentioned by Sir J. Barrow, that between the years 1779 and 1813, the diminution of sick and of deaths in the British navy was in the proportion of four to one nearly. (See *Supplement to Encyc. Britan.* art. Navy.)

Causes. In the preceding sketch of the history of scurvy we have found it difficult to avoid allusion to its causes, and to the means by which it may be prevented. The following observations must be considered, therefore, as the complement of what we have already said in reference to these subjects.

Salt Provisions. In consequence of the frequent occurrence of scurvy at sea, and on shore, in persons whose diet, like that of sailors, consisted chiefly of salt meat, it was at one time supposed to be occasioned by excessive use of salt. A more extended view of the circumstances under which scurvy arises, is sufficient to show that this opinion is erroneous.

Kramer, in the letter we have already quoted, informs us that the Germans, among whom scurvy occasioned such great mortality in the spring of 1720, in Hungary, ate no salt beef or pork, but, on the contrary, had plenty of fresh meat at a very low price.

The soldiers in the Russian armies, who, in the early part of last century suffered greatly from scurvy, had also no salt provisions. We have already remarked that the same was the case with our regiments at the Cape, in which scurvy prevailed in the autumn of 1836.

In the middle of last century, when Sisinghurst Castle in Kent was filled with French prisoners, scurvy broke out among them, although from the time of their arrival in England, they had eaten no salt provisions, but had been served daily with fresh meat and bread, but without greens or other vegetables.†

The severity of the winter of 1794–5, which we have already mentioned as the cause of the unusual prevalence of scurvy in the Channel fleet in the following spring, was also productive of scurvy on shore. During that spring cases of genuine scurvy were admitted into most of the London Hospitals; and Dr. Heberden has well described those of some patients that were under his own care in St. George's. Speaking of one of these patients, he says, " His diet

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* Observations of Sir R. Hawkins, Knt., in his Voyage to the South Sea, a. d. 1593. (*Purchas's Pilgrim*, vol. iv.)

† Address to the Royal Society, by Sir J. Pringle, 1776–7.

previously to the occurrence of scurvy, consisted of bread and butter, with tea for breakfast, fresh meat and bread for dinner, and water-gruel for supper. This was his common food at all times, excepting that he had been used to eat vegetables, which, on account of their high price, he had not been able to procure for some months." (*Med. Trans.*, vol. iv.)

From a paper published in the *Trans. of Med. and Phys. Soc. of Calcutta*, vol. iv., it appears that in the lunatic asylum at Moorshedabad, in that presidency, one-third of the inmates are annually affected with scurvy, which shows itself during the rainy and cold season, and disappears in the hot season. The diet of the inmates consists of rice, split peas, curdled milk, oil, salt, pepper, water; all good of their kind, and in sufficient quantity. In addition to this, a small quantity of tobacco is allowed them. Cakes, made of the flour of wheat, are occasionally substituted for rice; and fresh fish, and sometimes animal food is given to those who wish for a change of diet. It is remarked that no cases of scurvy have ever occurred in the jail, which is only about three hundred yards distant from the asylum, and in which the diet is in no respect better.[*]

The preceding instances are sufficient to show, that scurvy may arise independently of the use of salt provisions; there are other facts which lead to the conviction, that salt has no influence whatever in producing it.

It was remarked by Dr. Lind, who had the merit of first showing the error of the opinion in question, that few workmen in any business are so healthy as those engaged in the preparation of sea-salt; and that the persons who work night and day in the salt mines in Poland, and even live in them, are not at all subject to scurvy; on the contrary, remarkable for health and the vigour of their constitutions. (*Lind*, p. 51.)

Salt water, even in persons who have continued the use of it a long time, has never been known to bring on scurvy, and when given to scorbutic patients,—an experiment often tried,—it has in no instance been found to aggravate the disease. (*Lind*, p. 51, *Blane, Dis. of Seamen*, p. 296.)

Another circumstance of great moment in reference to this question, is the readiness with which scurvy may be cured by lemon juice, even while the patients continue to subsist on salt provisions. The history of modern navigation abounds with instances which establish this fact.

The circumstances we have adduced, showing that scurvy may prevail to a frightful extent among persons living solely on fresh meat; that persons who, from the nature of their occupations, are continually absorbing saline particles, are exempt from scurvy; that scurvy is not brought on by the use of sea water, which may be drunk with impunity, even by scorbutic people; and that the disease may be prevented for any length of time, in persons who subsist on salt provisions, and can be readily cured even in those who continue the use of them;—are sufficient to justify the conclusion, that salt has no share whatever in producing it.

The frequency of scurvy during long voyages led also to the supposition, that sea-air, or some unknown marine agency, had an especial influence in causing it. At present, this opinion scarcely needs refutation. Modern experience has amply proved, not only the harmlessness, but the extraordinary salubrity of sea-air. The fact, that it asserts no particular influence in producing scurvy, was, however, first established by Captain Cook, who, as we have before observed, performed with a company of 110 men, a voyage of more than three years with the loss of only one man by disease.

Impure air. It has been supposed, too, that the air of ships, impure from defective ventilation and want of cleanliness, has had some share in bringing on scurvy. But there is reason to believe that this opinion is as unfounded as

[*] Med. and Phys. Trans. of Calcutta, vol. iv. p. 16. Land Scurvy among the Natives, by B. Burt, M. D.

those we have already discussed. Scurvy is, at present, never met with in the most crowded and filthy parts of this metropolis, where, from the operation of the causes in question, fever almost always prevails. It was remarked by Dr. Lind that ship carpenters, though more exposed to the foul air of the hold, were not more subject to scurvy than the rest of the crew. Nor does attention to cleanliness and ventilation, when the causes of scurvy continue to operate, seem to have much influence in mitigating its severity. The writer of Lord Anson's voyage informs us, during the latter part of their run, before their arrival at the island of Tinian, all the ports were kept open, and uncommon pains taken in sweetening and cleansing the ship, without producing any abatement in the progress or the virulence of the disease.

Dr. Trotter, in his account of the health of the Channel fleet in 1795, says, " To have the thought of foul air as the cause of a scurvy when it appeared in the *Royal George* and *Queen*, would have been the last resource of a physician investigating causes, who had witnessed the admirable system of duty practised by Captains Domet and Bedford." (*Med. Naut.*, vol. i., p. 427.)

Another circumstance, which powerfully supports the opinion that the causes in question have no share in producing the disease, is the readiness with which scorbutic patients may be cured while they continue to reside on board. We have ample testimony in the writings of Sir Gilbert Blane and other naval physicians, that these patients recovered quite as rapidly on board their ships as in hospitals on shore. (*Diseases of Seamen*, p. 59; *Med. Nautica*, vol. i. p. 426.)

Cold; moisture. The fact that scurvy, when it first attracted attention, prevailed exclusively in northern countries, early led to the opinion that cold and moisture had considerable share in causing it; and this opinion has been maintained up to the present time by the highest authorities on this subject. Dr. Lind tells us, that Channel cruisers were often quickly overrun with scurvy, while their consorts, fitted out at the same port, and consequently with provisions and water of like quality, who soon after left them for a much longer cruise off the Canaries, or Cadiz, or a voyage to the Indies, kept pretty free from it; and that it always appeared in much shorter time, and raged with greater violence in a squadron cruising in the narrow seas of the Baltic and Channel, or upon the coast of Norway, or Hudson's Bay, than in another continuing the same length of time in the middle of the Atlantic ocean. (*Lind*, p. 63.)

Sir G. Blane expresses the same opinion, which seems, however, to have been refuted by his own experience while physician to the fleet in the West Indies.

An attentive consideration of the history of scurvy has convinced us, that the influence of these causes has been much over-rated, and that the comparative immunity from this disease formerly enjoyed by fleets in warm latitudes was mainly owing to the supplies of oranges and other fruits with which Cadiz, Madeira, or the islands of the West Indies furnished them.

We have already given instances* of the occurrence of scurvy in the highest degree during the months of summer, and in tropical climates; so that no temperature is a preservative from this malady; nor does change from a cold to a warm climate, where scurvy exists, seem in any degree to lessen its severity. The writer of Lord Anson's voyage says, " Some of us were willing to believe that in this warm climate, the violence of the disease, and its fatality might be in some degree mitigated; but the havoc of the distemper in our present circumstances soon convinced us of the falsity of this speculation."

In confirmation of this testimony we may again mention that, at present, the merchant-seamen who enter the port of London, affected with scurvy, come

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* In the sieges of Thorn and Alexandria; and in the voyages of Commodore Lancaster, Admiral Hosier, Admiral Geary, &c.

almost exclusively, from the Mauritius, India, Ceylon, or China; and have, consequently, been in no higher latitude than that of the Cape.

Another circumstance which shows that cold has not much influence in producing scurvy, is the readiness with which this disease can be prevented[*] or cured, even in the coldest countries. We have already noticed the entire exemption from scurvy enjoyed by the persons employed in our factories at Hudson's Bay; the same is the case in Greenland and Iceland. When the disease occurs in those climates it is quickly cured by lemon juice, or by sorrel or scurvy-grass, plants found in great abundance in the polar regions during the summer months.

That moisture alone is incapable of producing scurvy is evident from the example of Venice, and many insular positions, where the disease is never met with.

Contagion. Scurvy, like all diseases which have prevailed epidemically, was at one time, supposed to be contagious; but the error of this opinion was early shown by the almost constant exemption of officers in armies and in ships. The same opinion has been advanced, however, in modern times, and by an author of considerable merit. In further confutation of it, we cannot do better than repeat the just remark of Dr. Lind, that those authors should have given us attested histories of persons infected in this manner, where the other causes that always produce the disease had no influence. But no such histories are to be found.[†]

We have already seen that scurvy may occur in all climates, either on land, or at sea; in persons who subsist on salt meat or fresh; and in situations in which the utmost attention is paid to cleanliness and ventilation. There is one condition, however, which is necessary for the production of scurvy; namely, prolonged abstinence from succulent vegetables or fruits, or their preserved juices as an article of food. When this condition is fulfilled, we find scurvy arising in persons whose situations are the most various in every other respect in which we can compare them; while not a single instance can be cited of its occurring in a person well supplied with these vegetables or fruits. This circumstance, together with the fact that scurvy is, in all cases, rapidly cured when a supply of these vegetables or fruits is furnished, leads us to consider the abstinence in question as its essential and sole cause. We have said that this abstinence must be prolonged: it would seem, indeed, that in a person previously well supplied with vegetable juices, abstinence of from two to five months is necessary to produce the disease. On land, scurvy has shown itself always towards the end of winter or in spring; at sea, it has appeared after voyages of very different durations; in some cases, at the end of a month or six weeks; in others, after the lapse of five or six months. This difference depended on the time of year when the vessel left port, or rather on the previous diet of the men. Attention to this circumstance will serve to explain all the apparent anomalies which have forced writers on scurvy to have recourse to such a variety of causes.

Dr. Lind tells us that while he was surgeon of the *Salisbury*, in 1746 and 1747, scurvy raged with great violence in that ship, during two Channel cruises, one of ten weeks, the other of eleven; and that, in each of these cruises, it showed itself in less than six weeks, after they put to sea; yet, at the end of a subsequent cruise of twelve weeks, which was the longest the *Salisbury* made, there was but one scorbutic person on board. Dr. Lind could assign no cause

[*] In the second polar expedition of Sir E. Parry, scurvy showed itself only after the crews had spent two successive winters in the polar seas and when they had been for twenty-seven months in entire dependence upon the resources contained within their ships, unassisted by any fresh antiscorbutic plants or other vegetables. In this expedition Sir E. Parry left the Nore, with the *Hecla* and *Fury* on the 8th of May, 1821, and reached the Shetland Islands on his return on the 10th of October, 1823.

[†] Lind, p. 45, 146. Diseases of Seamen, p. 476. Fodéré, Dict. de Sc. Méd., art. Scorbut.

for this difference except the state of the weather. The real cause of it is undoubtedly to be found in the circumstance, that the two former cruises were made in the months of April, May, and June, so that the men left port in spring when scurvy was already imminent; while the last cruise was performed in the months of August, September, and October. (*Lind*, p. 56–65.) The great mortality from scurvy in the ships under the command of Commodore Lancaster in 1600, was principally owing to his having commenced the voyage in spring. In this instance cold had evidently no share in producing the disease. The same was the case with the squadron sent to the West Indies under Admiral Hosier in 1726.

The history of our navy abounds with similar examples. (*Diseases of Seamen*, p. 102–148.) We shall content ourselves with mentioning another instance which occurred in the Channel fleet in 1795, and which is illustrative of the same point. We have already stated that scurvy raged with extraordinary violence in the fleet in the spring of that year, and that it was suppressed by the abundant supply of lemons and salad furnished to the ships at Spithead in the latter part of May and the beginning of June. On the 10th of June the fleet again sailed, and scurvy soon made its appearance; but it was found from the list of patients that, during the cruise, which was a long one, not a man who had shared in the allowance at Spithead showed the slightest symptom of the disease. (*Med. Naut.*, vol. i., p. 423.)

It has been brought forward by writers on scurvy, as a strong argument in favour of the great influence which they ascribed to cold in the production of this malady, that the sailors most prone to it were those engaged in the northern whale fishery, although the vessels employed in this service were better fitted out than any others, with respect both to variety and quality of provisions; the voyage from this country short; and the men kept constantly in action. The fact has been unnoticed that these vessels always left this country in spring.

The great mortality occasioned by scurvy during the siege of Thorn, in 1703, admits of similar explanation. The siege, which lasted only five months, was carried on during the heat of summer. This circumstance, which rendered the mortality unaccountable to Bachstrom, Dr. Lind, and others, who believed that cold has great influence in causing this distemper, affords the true explanation of its unusual fatality. The siege was commenced in spring, when scurvy was already imminent in the inhabitants: had the siege been undertaken at the end of summer, they would have suffered comparatively little from the disease. The history of the siege of Alexandria furnishes us with a precisely parallel instance. The fatal effects of scurvy have, in fact, been generally felt most during sieges commenced in spring, and in voyages entered on in spring from cold countries. The siege and the voyage have in these cases prolonged to the inhabitants and the sailors, not the cold indeed of winter, but abstinence from fresh vegetables, which, in former times, the cold of winter always occasioned.

Predisposing causes. When a number of persons are placed in circumstances conducive to scurvy, the first to exhibit its symptoms are those who, from sickness or other causes, are in a state of debility.*

In the Channel fleet, in the spring of 1795, scurvy appeared chiefly in those men who were convalescent from an epidemic catarrh (*Med. Naut.*, vol. i., p. 407); and, during the siege of Alexandria, in 1801, those soldiers who had received severe injuries, or were reduced by the ophthalmia, which at that time prevailed among them, were the first to suffer from scurvy (*Larrey, Chir. Milit.* t. ii., p. 284).

It has often been observed to affect in especial manner persons recovering from intermittent fevers (*Lind.* p. 210); and our own experience furnishes us with several instances which tend to confirm that observation.

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* Lind. p. 77 and 402; Curtis's Diseases of India, p. 9.

Age. Scurvy may occur in persons of all ages. Dr. Mertans, in a paper published in 1778, when he was physician to the Foundling Hospital at Moscow, informs us that scurvy showed itself every spring among the children in that establishment, and that one year as many as sixty of them were affected with it. (*Phil. Trans.*, vol. lxviii.)

We have obtained from the registers of the *Dreadnought* the ages of 200 scorbutic patients received into that hospital; and we have arranged these so as to show how many of them were under 20, between 20 and 30, 30 and 40, and so on. These numbers we have compared, in the subjoined table, with the average numbers of merchant seamen whose ages are comprised within the same limits. The average numbers have been derived by taking from the registers at the Custom House, where the age of every sailor who comes into the port of London is registered, the ages of 5000 sailors, entered in succession, by arranging these so as to show the numbers whose ages are comprised within the limits in question; and by reducing these numbers to the scale of 200.[*]

PATIENTS.	AGE.					
	Under 20.	20–30.	30–40.	40–50.	50 and upwards.	Total.
No. of scorbutic patients - -	20	71	54	36	19	200
Average number of sailors - -	21·32	95·04	45·20	26·88	11·56	200

In this table, those in the first vertical column are almost all between the ages of 15 and 20; the second column (20—30) includes all whose ages have 2 for the first figure; the third (30—40) all whose ages have 3 for the first figure; and so on.

It appears from this table that persons between the ages of 20 and 30 are, of all persons above the age of fifteen, the least liable to scurvy; and that above the age of 30, the proportion of scorbutic patients continually increases with age. We are inclined to believe that the predisposing influence of age is even greater than is indicated by the preceding table. The average numbers in this table are derived from the ages of sailors, taken indiscriminately; whereas scorbutic patients all come from distant ports. Sailors engaged in the merchant service may be arranged in two classes; the one comprising those employed in the home, the other those in the foreign trade. Now, sailors advanced in life frequently leave the latter service for the former; and the mortality among seamen is greater in hot climates than in our own; so that there is reason to believe that the proportion of sailors of an advanced age is less in those engaged in the foreign trade, than in those employed at home.

Indolent, lazy habits, and despondency, have often been mentioned as exerting a powerful predisposing influence in the production of scurvy; and instances may be cited which seem to show the reality of such an influence.

In ships that have contained marines as well as sailors, the marines have in general been more affected with scurvy than the sailors.[†]

The historian of Lord Anson's voyage tells us, that " whatever discouraged

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[*] See. art. CHOLERA.

[†] See Diseases of Seamen, p. 322 and 465, and Rouppé *De Morbis Navigantium, Trans.*, p. 121.

the people, or at any time damped their hopes, never failed to add new vigour to the distemper ; so that it seemed as if alacrity of mind and sanguine thoughts were no contemptible preservatives from its fatal malignity."

It is probable, however, that the influence of these causes has been much overrated, and that listlessness and aversion to exercise, from being early and constant symptoms of the disease, have often been mistaken for its cause.

Preventives. We come now to speak in detail of the means by which scurvy may be prevented ; and shall first mention as the chief of these means, the use of oranges, lemons, or limes ; and, we believe, we might add, shaddocks, and all fruits which botanists have included in the order *Aurantiaceæ.*

The efficacy of oranges in preventing and curing scurvy was discovered before the disease had been described by physicians. Rousseus, one of the earliest writers on scurvy, in a work published in 1564, observes that seamen in long voyages cure themselves of it by the use of oranges. He conjectures that Dutch sailors, afflicted with scurvy on their return from Spain with a cargo of these fruits, had by chance discovered their efficacy.

Albertus, in a treatise on Scurvy, published in 1593, recommends the juice of oranges, and of sour and austere plants. He advises that this juice should be put into soups, and that meat, while roasting, should be sprinkled with it. In the same year, the virtues of lemon juice in the cure of scurvy were experienced by Sir R. Hawkins, whose crew, while within the tropics, were affected with it in an extreme degree.

We have already given an instance of the extraordinary efficacy of lemon juice as a preventive of scurvy, in the first voyage for the establishment of the East India Company in 1600. After this it seems to have been pretty generally used in the Company's ships ; and, in a medical work published in this country in 1636, it is recommendde as the best remedy for scurvy.

From this time it is recommended by a series of writers who have treated of this subject ;[*] and instances which show its extraordinary efficacy are to be frequently met with in our naval annals.

When Admiral Sir C. Wager commanded our fleet in the Baltic, in 1726, his sailors were dreadfully afflicted with scurvy. He had recently come from the Mediterranean, and had on board a great quantity of lemons and oranges, which he had taken in at Leghorn. Having often heard of the efficacy of these fruits, he ordered a chest of each to be brought upon deck, and opened every day. The men, besides eating what they liked, mixed the juice with their beer. It was also their constant diversion to pelt one another with the rinds, so that the deck was always strewed with them, and wet with the fragrant liquor : the happy result was that he brought his sailors home in good health. (*Mead on Scurvy.*)

Most of these proofs of the efficacy of oranges and lemons were collected by Dr. Lind, and published in his justly celebrated work on Scurvy in 1757. His earnest recommendation for the general employment of these fruits in the navy was, however, not acted upon for some time ; the disease continued to depopulate our fleets, offering a striking example of the delay which sometimes attends the practical application of most important truths. To the cause of delay in the present instance, we shall allude particularly hereafter (see chap. on *Diagnosis*) ; at present we only mention the fact, as one of the most singular and instructive in the history of the disease. We have already noticed the prevalence of scurvy in our fleet in the West Indies in the years 1780–1–2, and in the Channel fleet in 1795. The history of these fleets afford numerous proofs of the efficacy of the fruits in question ; but in 1794 an experiment was made which established it beyond doubt. The *Suffolk* of 74 guns, sailed from England for Madras on the 2d of April, 1794. She was provided with lemon juice ; and two-thirds of

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* John Drawitz, 1647; Une Voyage aux Indes Orientales, par. M. Dillon, M.D. 1683; Martin Lister, 1694.

a liquid ounce of this juice, together with two ounces of sugar, were mixed with each man's daily allowance of grog.   The Suffolk was twenty-three weeks and one day on the passage, during which she had no communication with land. Scurvy showed itself in a few men in the course of the voyage, but soon disappeared on an additional quantity of lemon juice being given them; and the ship arrived at Madras, without the loss of a single man, and with her crew entirely exempt from scurvy.*

It is to the representations of Dr. Blair and Sir G. Blane, in their capacity of commissioners for the relief of sick and wounded seamen, enforced by the result of this experiment in the *Suffolk*, that we owe the systematic introduction of lemon juice into nautical diet, in 1795, by order of the Admiralty.   We have already spoken of the improvement in the health of the navy consequent on this wise measure; but we may be permitted to mention the following circumstances which show how completely it has realized the expectations of its proposers.

In 1780, 1457 cases of scurvy were admitted into Haslar Hospital: in 1810, one of the physicians of that hospital informed Sir G. Blane that he had not seen a case of it for seven years; and, in the four years preceding 1810, only two cases were received into the naval hospital at Plymouth.   At present, there are many surgeons in the navy who have never seen a case of scurvy, which has, in fact, been expunged from the list of diseases incident to seamen in the navy.

The present allowance of lemon juice in the navy consists of a fluid ounce, which, after ships have been a fortnight at sea, is served daily with an ounce and a half of sugar to each of the men.

Dr. Lind recommended a *rob*, formed by evaporating the juice, by a slow heat, to the consistence of thick syrup.   This was found to be very inferior in efficacy to the fresh fruit (*Diseases of Seamen*, p. 56; *Med. Nautica*, vol. i. p. 425); and Sir G. Blane, in consequence, advised that the juice should be preserved by the addition of a small quantity of spirit, without the aid of heat; a plan now generally adopted.   The juice with which the navy is supplied is brought from Sicily, and kept good by the addition of one part of strong brandy to ten of the juice.   When preserved in this manner, its virtues seem unimpaired.

These fruits, when employed in the treatment of scurvy, combine all the good qualities we can desire in a remedy.   They have a specific influence in curing the disease, but produce no other sensible effect, except a small increase in some of the secretions; and the eating of them is attended with great pleasure.   Dr. Lind tells us that he has often observed, upon seeing scorbutic people landed at our hospitals, that the eating of these fruits was attended with a pleasure more easily imagined than described; and his testimony is confirmed by that of other naval physicians.

Oranges, lemons, and limes, seem to have nearly equal efficacy: and perhaps the same may be said of shaddocks, and all fruits of a like kind.   Dr. Lind, however, from some comparative trials, was led to give oranges a preference to lemons.   It is probable that the state of the fruit, as to maturity, has considerable influence on its virtues.   That such is the case with the guava, appears clearly from an experiment made by Dr. Trotter.   Having repeatedly observed scorbutic slaves throw away ripe guavas, while they devoured green ones with much avidity, he resolved to try if any difference could be remarked in their effects.   For this purpose he selected nine blacks affected with scurvy in nearly equal degree.   To three of these he gave limes, to three green guavas, and to three ripe guavas.   They were kept under the half-deck, and served by himself two or three times a day.   They lived in this manner for a week; at the

* Sir G. Blane, *Comparative Health of the Navy.*

end of which those restricted to ripe guavas, were in much the same state as before the experiment, while the others were almost well.

Most sour fruits are in all probability antiscorbutic. The good effects of unripe grapes were noticed by Fodéré in the French army of the Alps, in 1795; and, in 1824, when scurvy prevailed among our troops at Rangoon, in India, great benefit was derived from giving the men the fruit of the *Phyllanthus Emblica*, or Anola; which, when dry, as sold in bazaars, has a rich and strongly acid taste, with a flavour resembling that of tamarinds. (*Quarterly Journal of the Med. and Phys. Society of Calcutta*, vol. i. p. 306.) The efficacy of apples, as a preventive of scurvy, was alluded to by Sir J. Pringle in an address to the Royal Society, in 1776; and the following proof of their curative virtues is given by Dr. Trotter :—When Lord Bridport's fleet arrived at Spithead on the 19th of September, 1795, almost every man in the fleet was more or less affected with scurvy. Large supplies of vegetables were provided, and lemon juice being scarce in consequence of the previous great consumption, fifty baskets of unripe apples were procured at the Isle of Wight for the use of the fleet. The *Royal Sovereign*, in particular, derived great benefit from them ; and the cure of the disease was every where so speedy, that little remained to show Earl Spencer, when he visited the fleet at the end of the month. (*Med. Naut.*, vol i. p. 420.)

As the expense of lemon juice offers great impediment to the employment of it in the commercial marine of this country, to the extent necessary for complete extinction of scurvy, it deserves to be ascertained whether the juice of apples, preserved like that of lemons, by the addition of a certain proportion of spirit, would not be an effective substitute.

All succulent vegetables that are wholesome, are perhaps, as well as fruits, more or less antiscorbutic; but this property seems to be possessed in the highest degree, by plants comprised in the order *Cruciferæ*, in which most of the vegetables in common use, as the cabbage, turnip, radish, water-cress, &c. are included.

In the earliest notices of scurvy, mention is made of the efficacy of herbs of this class in its treatment.

Rousseus, writing in 1564, informs us, that the common people cured themselves by scurvy-grass, brook-lime, and water-cresses. W. Cockburn, in a work published in 1796, entitled *Sea Diseases*, remarks the extraordinary efficacy of vegetables in the treatment of this distemper. As a proof of it he mentions the following circumstance :—When Lord Berkeley commanded the fleet in Torbay, Mr. Cockburn prevailed on his lordship to erect tents for the sick on shore. Above a hundred of the most afflicted scorbutic patients, perfect moving skeletons, hardly able to get out of their ships, were landed, and fresh provisions, including carrots, turnips, and other vegetables were given them. In a week they were able to crawl about ; and before the fleet sailed, they returned healthy to their ships. The subsequent history of scurvy abounds with instances equally decisive ; but the strongest proof of the efficacy of vegetables of this class, is derived from the fact that the disease, when it occurred on land, uniformly disappeared during summer and autumn; and that it gradually became less frequent as the consumption of vegetables increased.

There seems to be no country naturally destitute of remedies for scurvy. The fruits of tropical and temperate climates are replaced in countries within the polar circle by herbs of almost equal efficacy. We are told that in Greenland, where scurvy was formerly very common, the natives employed sorrel and scurvy-grass together, and that by these herbs, which were put into broths, the most advanced cases were cured in a surprisingly short time.[*]

Sir Edward Parry informs us that the Esquimaux eat sorrel but not scurvy-

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[*] Lind, p. 214. Also, for a remarkable instance of the efficacy of scurvy-grass, see a paper by Bachstrom, published by Haller in Disput. ad Morbos, vi.

grass.   In the narrative of his first voyage of discovery, he gives an instance
from his own experience of the good effects of sorrel.   He sailed from London
in the beginning of May, 1819, and in the following spring scurvy showed
itself in four of his men.   In the early part of April, in consequence of a serious
loss of lemon juice, from bursting of the bottles by frost, the daily allowance of
it was diminished one-third, and in the middle of June it was entirely discon-
tinued.   At this period the sorrel began to vegetate, and the men were enjoined
to gather daily a prescribed quantity : in the month of August it increased
almost to exuberance, and proved a most valuable antiscorbutic.

The garden-cresses also have been especially noticed for their antiscorbutic
qualities.   It was suggested by Bachstrom, that the inhabitants of a besieged
town, by sowing the seeds of these herbs on the ramparts, or even in their
apartments, might, in a few days, furnish themselves with a fresh antiscorbutic
salad.   Dr. Lind* recommended the adoption of the same measure in ships
during long voyages ; and his advice has been recently followed by Sir Edward
Parry.†   We have quoted the following passage from the narrative of the first
polar expedition of this enterprising navigator :—" I began also about this time
to raise a small quantity of mustard and cress in my cabin, in small shallow
boxes, filled with mould, and placed along the stove-pipe ; by this means, even
in the severity of the winter, we could generally insure a crop at the end of the
sixth or seventh day after sowing the seed ; which, by keeping several boxes at
work, would give to two or three scorbutic patients nearly an ounce of salad
daily ; even though the necessary economy in our coals did not allow of the fire
being kept in at night.   The mustard and cress thus raised were necessarily
colourless from privation of light, but as far as we could judge, they possessed
the same pungent aromatic taste, as if grown under ordinary circumstances, and
appeared to be equally efficacious."

We have already spoken of the pleasure which scorbutic persons derive from
eating oranges ; in treatises on scurvy frequent mention is also made of their
relish for fresh vegetables.   Bachstrom tells us, that at the siege of Thorn,
when some of the coarsest vegetables were sent into the town by the enemy,
for the use of a particular family, they were seized on by the officers at the
gates, and greedily devoured as the greatest delicacies.   (*Haller, Disp. ad
Morbos*, vi.)

It appears that the antiscorbutic virtue of vegetables is greatest when they
are eaten raw.   Herbs in the form of salads are more efficacious than when
boiled, or any way prepared by heat ; and their antiscorbutic properties are
entirely destroyed by drying.‡   Kramer tried a great variety of dried plants to
no purpose ; and the college of physicians at Vienna, when applied to by him,
sent into Hungary a large supply of the most approved antiscorbutic herbs, pre-
pared in this manner, but they were productive of no benefit.

Pickles.   But when vegetables are preserved as pickles, their antiscorbutic
properties are retained.

It was observed that Dutch ships were formerly much less subject to scurvy
than our own ; and in some instances, when our fleet has acted in concert with
that of the Dutch, our sailors have become affected with scurvy, while the Dutch
continued free from it.   This immunity on the part of the Dutch was owing to
the use of sour krout, which was regularly supplied to their ships.

The extraordinary health of the *Centurion* in the memorable voyage of Cap-
tain Cook, seems to have been mainly owing to a liberal supply of sour krout.
A pound of it was served to each man twice a week, or oftener throughout the
voyage.

* Lind, p. 141.
† In his first polar expedition, Captain Parry sailed from London with the *Hecla* and *Griper*,
on the 5th May, 1819, and returned on the 26th Sept. 1820.
‡ See Lind, p. 170.   Diseases of Seamen, p. 56.   Phil. Trans. vol. lxviii.   Obs. on Scurvy,
by Dr. Mertans.

In a paper published in 1770, in the *Transactions of the Royal Society*, Dr. Mertans informs us that, during a residence of many years in Moscow, he frequently met with cases of scurvy among gentlemen and merchants, but very rarely in persons in the lower classes. The comparative immunity of the latter, he ascribed to their eating plentifully, all the year round, sour cabbage soup and vegetables, which were sparingly used by the rich, whose diet consisted chiefly of fresh animal food and bread.

In 1780, *sour krout* was furnished to our navy as a regular article of ship's provisions; and in the history of the fleet about that time, we find many proofs of its good effects. The allowance was two pounds a week to each man. (*Dis. of Seamen*, p. 140. 287.)

Sour krout is prepared in the following manner :—The soundest and most solid cabbages sliced, as we slice cucumbers, are put into a barrel in layers, hand high; over each layer is strewed a handful of salt and caraway seeds; the whole is then rammed down, and the process continued till the barrel is full, when a cover is put over it and pressed down by a heavy weight. After standing some time in this state the cabbage begins to ferment, and it is not till the fermentation has entirely ceased, that the barrel is finally shut up. Vinegar is not, as some have imagined, employed in the preparation of sour krout. (*Cyc. Prac. Med.*, art. SCORBUTUS.)

In Austria, and several parts of Germany, people eat *sour turnip*, which is prepared in the same manner as sour krout;* in fact, most vegetables may be preserved by this method; and we strongly recommend a trial of it, with scurvy-grass and sorrel, to navigators who may in future be compelled to winter in the polar seas.

The fir-tribe deserve to be next mentioned, on account of their antiscorbutic properties. These, like many of our best remedies, were discovered by chance. When the Swedes were at war with the Muscovites, almost all the soldiers in the Swedish army became affected with scurvy. Its progress was arrested by the use of a simple decoction of fir-tops, which was found equally efficacious as a preventive and a remedy. This medicine acquired, in consequence, great reputation, and the common fir, *Abies rubra*, was afterwards called *Pinus antiscorbutica*.

The mountain pine, *Pinus sylvestris*, has likewise been found highly antiscorbutic. In 1736, two squadrons, fitted out by the court of Russia, were obliged to winter in Siberia. One, not far from the mouth of the river Lena, was attacked by scurvy. The sailors, in their distress, by chance found this tree growing in the mountains near them, and discovered that it had a most surprising antiscorbutic virtue. At the same time, the crews of the other squadron, who were passing the winter in the river Judoma, were much afflicted with the same disease. They, too, chanced on the pines, which grew plentifully on the mountains, and by the use of them, in decoction, were all perfectly restored in a few days. In some, this medicine proved gently laxative; in others it affected the body so mildly, that its operation was scarcely sensible. (*Lind*, p. 177.)

From the description given by Cartier of the *Ameda* tree† (by a decoction of the leaves and bark of which his crew were so speedily cured), it would seem that it was the large spruce tree of American swamps. All pines and furs, indeed, though differing from each other in form and appearance, seem to have analogous medicinal virtues, and great efficacy in the prevention and cure of scurvy.

Onions, garlic, and vegetables of the same class, were at one time much used

* See Phil. Trans. vol. lxviii.

† Cartier says, " It wrought so well, that if all the physicians of Montpellier and Louvain had been there with all the drugs of Alexandria, they would not have done so much in one year as that tree did in sixe dayes : for it did so prevaile that as many as used of it, by the grace of God, recovered their health." (*Hakluyt's Coll. of Voyages*, vol. iii.)

for the prevention of scurvy at sea; but they are now very rarely employed for that purpose.

Potatoes also, when raw, seem to be antiscorbutic; and Sir G. Blane informs us that, in 1780, they were used with advantage in the fleet. (*Dis. of Seamen*, p. 57.) They will keep a considerable time in a warm climate, and in point of economy have an advantage over most articles employed as antiscorbutics.

Infusion of malt, which had been before recommended as a remedy for scurvy,* was employed for that purpose by Captain Cook, who speaks in very high terms of it. He took with him in the *Centurion*, a large supply of malt, for the purpose of making sweet wort, of which from one to three pints were given daily to each man.† The good effects of wort in the treatment of scurvy have also been noticed by others.‡

In 1780, our fleet in the West Indies was supplied with essence of malt. We are told by Sir G. Blane, that it proved of service; but its antiscorbutic properties were inconsiderable; so much so, that some of the surgeons even denied that it had any. It was only in the early stages of the disease that the effects of it were sensible. (*Ibid.* p. 55, 141, 464.)

We can reconcile this with the testimony of Captain Cook, and others, in favour of the antiscorbutic properties of infusion of malt, only by supposing that those properties were impaired by the process of extracting the essence; just as those of lemon juice are impaired in the preparation of syrup.

Molasses, also, was recommended, about the same time; and, in the *Foudroyant*, the ship in which it was first tried, it answered so well, that in a cruise under Admiral Geary, in 1780, she was the only ship in the squadron that was free from scurvy, which prevailed to such an extent in the other ships, that, on their return to Portsmouth, in the month of August, 2400 men were sent to the hospital affected with it. (*Ibid.* p. 290.)

Subsequently, by order of Lord Howe, molasses was served with rice to the men who were scorbutic, or threatened with scurvy, in the squadron which he commanded; and the benefit derived from it was so great, that, during the last two years of the war, molasses was made a regular article of ships' victualling, and substituted for a certain proportion of oatmeal. (*Ibid.* p. 287.)

The disease was unquestionably much mitigated by this regulation, but was far from being entirely prevented. It prevailed even to a great extent in some ships well supplied with molasses. (*Ibid.* p. 55.)

There is reason to believe that the antiscorbutic properties of sugar-cane are greater than those of molasses, and that they are much impaired by the process employed in the manufacture of sugar.

Fermented Liquors. Spruce beer seems to be the most efficacious of fermented liquors. We have abundant proof in the experience of the Northern American colonies, and of the countries bordering on the Baltic, that it is not only an effectual preventive, but an excellent remedy. It has this advantage, that materials for it can often be procured, at all seasons, in countries in high latitudes, where the scarcity of fruits and vegetables renders a powerful antiscorbutic extremely valuable. These materials can also be carried about, and used occasionally; a plan adopted by Captain Cook with great advantage.

Malt liquors possess similar virtues. Frequent notices of the benefit derived from the use of small beer at sea, are to be met with in the writings of our naval physicians; and Sir G. Blane has recorded a striking instance of the good effects of porter. (*Dis. of Seamen*, p. 301.) Instances are also to be found which afford evidence of the antiscorbutic properties of cider. (*Lind*, p. 150; *Sir J. Pringle's Address to the Royal Society*, p. 15.)

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* Method of Treating the Scurvy at Sea, and Use of Wort in it. London, 8vo. 1767. (Anonymous.)

† Phil. Trans. 1776. Address by Sir J. Pringle.

‡ Med. Obs. and Inq. vol. v. *On the Use of Wort in the Cure of Scurvy*: by J. Badenoch, M.D.

Wine ranks next to spruce beer and malt liquor in efficacy, and it is perhaps to the habitual use of it that must be ascribed the fact, that the French fleets have generally been less subject to scurvy than our own.

The superiority of wine over spirits in this respect has, indeed, been frequently noticed; and Sir G. Blane was so convinced of it, that in a memorial, presented to the Board of Admiralty in 1781, he recommended the substitution of wine for rum in the victualling of the fleet. He agrees with Dr. Lind in ascribing even a pernicious influence to distilled spirits.* (*Lind*, p. 81; *Dis. of Seamen*, p. 334.)

The good effects derived from the use of lemons and other sour fruits, were naturally attributed to their most striking quality, acidity, and it was imagined that *vinegar* would prove of equal service. It was, in consequence, early recommended as a preventive of scurvy. Experience, however, has shown that this opinion is unfounded. Dr. Lind, in the middle of last century, when scurvy proved so destructive in our fleets, remarked that few ships had ever been in want of vinegar. (*Lind*, p. 158.) Testimony to the same effect has been given by other naval physicians. Vinegar was liberally supplied to our fleet, in which scurvy was so fatal, in the West Indies in 1780, and the two following years (*Dis. of Seamen*, p. 284), and Dr. Trotter, in his account of the health of the Channel fleet, in 1795, says that vinegar was carefully served to the messes of seamen, throughout the squadron, to be used with the salt meat; yet in those ships in which the men took it in large quantities, it was not observed to retard the progress of the disease. (*Med. Naut.* vol. i. p. 418.)

Our own experience furnishes us with many instances of the occurrence of scurvy in a high degree, in ships well supplied with vinegar, even in voyages of moderate duration; but in the cases in which we have witnessed the disease in the most aggravated form, the crews had no regular allowance of this article. From the facts that have fallen under our own notice, we are led to ascribe to vinegar some antiscorbutic virtue, equal perhaps to that of malt liquor or cider, but not sufficient to render it a substitute for lemon or lime juice. There is indeed some degree of contradiction in the testimony of naval physicians respecting the antiscorbutic properties of vinegar, which renders it likely that these vary in some degree with the material from which the vinegar is prepared.

All the substances which we have mentioned as preventives of scurvy, are derived from the vegetable kingdom; and it is probable that antiscorbutic properties are possessed exclusively by substances of vegetable origin. All the mineral acids, and, indeed, most medicines derived from the mineral kingdom, have been tried without success. The antiscorbutic virtue is, as we have seen, possessed in very different degrees by different classes of vegetables and fruits, but in the lowest degree, if at all, by those which are farinaceous. Dr. Lind remarked that scurvy was most commonly met with on land, in persons who subsisted chiefly on dried or salt fish or flesh, and the unfermented farines; or upon bread made of peas, or a composition of peas with oats. (*Lind*, p. 93.) Kramer informs us that in his time the disease often occurred in Germany among people, who lived altogether on boiled pulses, without eating any green vegetables or summer fruits. We have already mentioned the prevalence of scurvy among Russian soldiers, whose principal food was rye bread, and meal, and among the inmates of the lunatic asylum at Moorshedabad, where rice and split peas formed the chief articles of subsistence. Its occurrence has also been noticed in prisoners kept on a diet of bread and water. (See a *Letter on Solitary Confinement*, by J. G. Malcolmson, Esq.)

Fresh leavened bread has, however, been supposed to be highly antiscorbutic,

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* The opinion that distilled spirits have a pernicious influence, is warmly opposed by Dr. Nathaniel Hulme in a Latin thesis, in which the reader will find an elegant and very accurat description of the symptoms of scurvy. (*Dissertatio Inauguralis, De Scorbuto.*)

and has, in consequence, been recommended by many writers on scurvy; but we must bear in mind that the good effects ascribed to it have been witnessed in sailors, on their return from a long voyage, who were supplied not only with fresh bread, but also with vegetables, the efficacy of which was probably not duly appreciated. The antiscorbutic properties ascribed to bread, seem incompatible with the fact of which we could bring many proofs, that scurvy may occur in persons with whom bread forms the main article of subsistence.*

It has been supposed that flour is antiscorbutic in a much higher degree than biscuit, which has been subjected to the influence of a strong heat; and Sir G. Blane in consequence recommended that in the navy a portion of the present allowance of biscuit should be discontinued, and compensation given in flour, which might be made into bread or puddings. This advice was followed by Sir Edward Parry, who, in his first Polar expedition, by taking with him a supply of flour, was enabled to furnish his crew with a daily allowance of well fermented bread.

There is, however, a preparation of oatmeal, which seems to have great efficacy in preventing and curing scurvy. This is *sooins*, or *sowens*, an article of food well known in Scotland. It is prepared by pouring hot water on some oatmeal in a wooden vessel, and allowing it to stand till the liquid grows acidulous, which, in a place moderately warm, happens in about two days; the liquid is then poured off from the grounds, and boiled down to the consistence of jelly. Sir J. Pringle has given a remarkable instance, not, however, from his own experience, of the efficacy of this preparation;† and Sir G. Blane considered it of equal virtue with any antiscorbutic, except the juice of oranges and lemons; and informs us that he knows some well attested instances of crews saved from scurvy by this alone. (*Dis. of Seamen*, p. 291.) It would be interesting to ascertain whether the acetous fermentation, excited as in sooins, would impart similar properties to other farinaceous substances.‡

We have already given examples of the occurrence of scurvy, in the highest degree, in persons well supplied with fresh animal food; and instances are not wanting, which show that food of this kind is without much efficacy as a remedy. Dr. Lind tells us that in the *Salisbury*, during a Channel cruise in 1746, the scorbutic people, by the liberality of their commander, were daily supplied with fresh provisions, such as mutton broth and fowls, and even meat from his own table; yet, at the expiration of ten weeks, they brought into Plymouth eighty men, more or less afflicted with scurvy, out of a complement of 350. (*Lind*, p. 66; see also *Lind*, p. 137, and *Dis. of Seamen*, p. 462.)

The opinion that scurvy can be prevented, or cured by fresh meat, is however still held by persons, by whom it is of the utmost importance that correct notions on this subject should be entertained. We have known the most fatal effects result from the erroneous opinions of captains of merchant vessels on this point. During the course of the present year, the captain of a vessel trading to the Mauritius furnished his men, while they stayed at the island, with a plentiful supply of fresh beef, which, being imported from Madagascar, is procured at considerable expense; but neglected to provide them with vegetables or limes, which abound in the island, and are sold at a price scarcely worth naming. The consequence was that scurvy broke out soon after they set sail; and before the ship arrived in this country, one half the men before the mast had died of it, and the rest were totally disabled.

* See Med. Trans, vol. iv.; and vol. ii. paper by Dr. Milman.
† Address to the Royal Society in 1776, p. 18.
‡ The antiscorbutic properties of sooins require to be substantiated by facts. In the instance mentioned by Sir J. Pringle, no detailed account of the circumstances is given; it is noticed, however, that the sooins was seasoned with some prize wine which had turned sour, and which may with reason be supposed to have had some share in restoring the men. Sir G. Blane is content with expressing his opinion of the efficacy of sooins, without stating the facts on which that opinion was founded.

Portable soup was much used by Captain Cook, and has been extensively employed by Sir Edward Parry, and other modern navigators. Its antiscorbutic properties must depend chiefly on the vegetables it contains.

The facts we have adduced seem to lead to the following general conclusions.

1. That antiscorbutic properties reside exclusively in substances of vegetable origin.

2. That these properties are possessed in very different degrees by different families of plants; and that vegetables and fruits, which are farinaceous, possess them in the lowest degree; while all those, which possess them in a very high degree, are succulent.

3. That the antiscorbutic virtue resides in the juices of the plant; that it is, in general, considerably impaired by the action of strong heat, and by the process of vinous fermentation; and that it varies, in some degree, with the state of maturity of the plant from which it is derived.

4. That these properties of vegetables are not destroyed, but in some instances seem even to be developed by the process of acetous fermentation.

We are ignorant of the essential element, common to the juices of antiscorbutic plants, on which the properties in question depend; but shall, probably, not be deemed too sanguine, if we anticipate that the study of organic chemistry, and the experiments of physiologists, will at no distant period throw some light on this subject.

We cannot bring this part of our subject to a conclusion, without insisting on the importance of making a certain proportion of succulent vegetables an occasional article of food in jails, poorhouses, and especially in lunatic asylums;[*][†] in fact, in all establishments where persons are kept a long time on a diet regulated by principles of economy, and subject to little variation. In the provisioning of troops, also, in districts which have been laid waste, or where the winter is long and severe, we would recommend the adoption of the same measure, particularly during spring; and, in cases in which difficulty of procuring fresh vegetables is likely to arise, that lemon juice, as in the navy, should be provided in their stead.

Such a regulation would, we believe, contribute much to the health of the men, and would effectually prevent scurvy, which, we have no doubt, occurs much more frequently under the circumstances we have mentioned, than is generally imagined. The approach of the disease is, in fact, so gradual, that it may advance far enough to reduce the strength of the men considerably, before the real nature of it is discovered by a surgeon, not familiar with its symptoms or not expecting to meet with it. Dr. Murray, in the report from which we have derived the account we have given of the prevalence of scurvy among our troops at the Cape, in the autumn of 1836, informs us that such was the case in that instance: "that it was not recognised for some time after it appeared, nor until the morbid diathesis had widely extended itself in the corps." He adds also, "I candidly confess that, although I had before treated cases of this malady, I did not know it by its proper name, but used incorrectly to return

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* We have already mentioned, that the inmates of the Lunatic Asylum at Moorshedabad are annually affected with scurvy; while those of the jail, which is very near the asylum, continue free from it. In the Lunatic Asylum at Madras, also, scurvy occasionally shows itself. The greater frequency of scurvy in lunatic asylums, than in other establishments in which the diet is in no respect better, is, we imagine, not owing to greater liability to the disease in lunatics, but to the great length of time they remain in those establishments. In the Milbank Penitentiary, in 1823, scurvy first appeared in those who had been longest confined there. The occurrence of scurvy in persons long insane, has also been noticed in this country. (*See Pritchard on Insanity*, p. 149.)

† We have met with a partial epidemic of scurvy associated with malignant dysentery in a lunatic asylum: the chief cause seemed to be want of sufficient exercise in the open air, and a deficiency in fresh vegetable food. It gradually ceased as soon as this was remedied. The bodies of chronic lunatics seem to be always in a condition which depresses the powers of life, and renders them to a great degree incapable of resisting severe diseases.   G.

it under the heads, Purpura, Cachexia, Neuralgia, Rheumatism, Œdema, &c., until its late extraordinary prevalence in the 75th regiment (at the Cape), and the recent admission into the civil hospital there, from whaling vessels, of a number of sailors affected with it; which attracted my particular attention to its diagnosis."

Symptoms. A change in the complexion, from its natural healthy tint to a pale, slightly sallow, and dusky hue, is generally one of the earliest indications of scurvy. This change is attended with great languor and despondency, and with aversion to every kind of exercise, and the patient is readily fatigued, and complains of pains in the muscles, especially of the legs and loins, like those produced by over-exertion. The gums soon become sore, and apt to bleed on the slightest touch. On examination, they are found to be swelled and spongy, and of livid redness. Lividity of the gums first appears, and is always deepest at their free edges, diminishing gradually towards the roots of the teeth; while the lining membrane of the lips does not exhibit it in the slightest degree, but, on the contrary, is unusually pale.

As the disease advances, all these symptoms become more marked; the complexion acquires a more dingy and somewhat brownish hue; the debility increases, so that the least exertion causes breathlessness and palpitation, and not unfrequently an alarming syncope; the gums become more swelled and more livid, forming, in some cases, a black spongy mass, which completely conceals the teeth, and they frequently slough, especially at their edges, leaving the crowns of the teeth exposed; the teeth themselves become loose, and often drop out, without having suffered decay; and the breath is remarkably offensive.

The patient, from the beginning of the affection, is subject to hæmorrhages. These occur most frequently from the gums and nose, and from any ulcers he may happen to have; but often, also, from the intestines; occasionally from the stomach; and, in some rare instances, from the bladder. Of the last nine cases that have fallen under our observation, in all which the disease was advanced, seven presented epistaxis. In most of these, bleeding from the nose occurred, for the first time, at an early period of the disease, and recurred several times, but in all it ceased spontaneously. In three of these nine cases, blood has been passed by stool: it is probable that hæmorrhage from the intestines happened in a greater number of these cases, but was unobserved. In none of them was there any hæmorrhage from the stomach, lungs, or bladder. In taking notes of these cases, great attention was paid to this point. Of twenty-seven cases, the notes of which were taken previously, but not with equal care, three presented hæmatemesis; and in one of these three the vomiting of blood recurred several times. We have never had a patient affected with scurvy in whom hæmorrhage from the bladder, or hæmoptysis, was stated to have occurred.*

Ecchymoses also appear on the skin, in the form of petechial spots, particularly on the lower extremities; often, however, in advanced stages of the disease, on the arms and trunk, but rarely on the head or face. These petechiæ, which are sometimes very numerous, are generally small and circular; the centre of each spot being the point at which the skin is perforated by a hair. Besides these petechial spots, we often meet, especially when the disease is far advanced, with other spots, as large as the palm of the hand, sometimes much larger, in which the skin is of a variegated violet and green tint, and which resemble in every respect marks produced by a severe bruise. These bruise-like marks occur without the infliction of any blow, or at least of one sufficient to attract the patient's attention, and often surround an old scar, or appear on a part, which, a long time previous, had been the seat of some injury. Like the smaller petechial spots, they are met with most frequently on the lower

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* We have stated that hæmorrhages occasionally take place from the bladder, on the authority of Dr. Lind, and other authors.

extremities, but are not uncommon on the arms and trunk, and in a few instances we have observed them along the border of the lower jaw.   Effusions not, we imagine, of pure blood, but composed chiefly of its fibrinous portion, take place also in deep-seated cellular tissue, and between layers of muscles, particularly in the legs and thighs.   The parts which are the seat of these effusions are painful, when pressed or moved, and are much swollen, and of a hardness like that of board, so that they resist the strongest pressure of the finger. The skin covering these parts is thickened, and firmly adherent to the parts beneath,* from which a fold of it cannot be pinched up : it sometimes retains its natural colour, but more commonly presents the appearance of a bruise.

These effusions are sometimes very partial, frequently confined to the calf or thigh of one leg ; but their most common seat is the ham, where the swelling is often very considerable, and always attended with stiffness and contraction of the knee-joint.   This swelling of the ham and contraction of the knee-joint, a symptom which has much attracted the attention of writers on scurvy, sometimes occurs very early, and in cases in which the other symptoms are mild. In a patient at present under our care, in whom the other symptoms of scurvy are by no means severe, the calf and ham of the left leg are much swollen, and the knee-joint is stiff and contracted, the leg being at right angles to the thigh. This swelling of the ham, and contraction of the knee-joint, came on at a very early stage of the complaint, and were attended with pain on any attempt to move the leg, and with some degree of tenderness on pressure, symptoms which have ceased, however, after a treatment of two or three days : the parts which are thus swollen are hard and brawny, and no impression is left by the finger, except over the tibia, where there is some pitting.   The skin is thickened, and glued to the parts beneath, but presents no discoloration, except on the inner aspect of the calf, where, in a space nearly as large as the palm of the hand, it has the appearance of a bruise, and gives to the hand a sensation of greater heat than elsewhere.   There is not at present, nor has there been from the commencement, any swelling or œdema of the foot.   There are a few scattered petechiæ on this, and on the opposite leg, which is free from swelling, and of which he retains the perfect use.

Contraction of the joint (which has been ascribed in such cases to contraction of the tendons), as well as swelling of the ham, result we imagine, from a solid effusion, chiefly of the fibrinous part of the blood, between the tendons and the bone ; which, acting as a foreign body, prevents the tendons from coming in opposition to the bone, which is necessary for extension of the leg.

Stiffness and contraction, such as we have described, are not peculiar to the knee-joint.   Instances are mentioned by authors of similar contraction of the elbow-joint (see *Phil. Trans.*, vol. lx. paper by Dr. Mertans) ; and in a case which has recently come under our notice, both ankles were affected in like manner.   In this patient there was no swelling of the calves or contraction of the hams, but the feet were extended and the heels drawn up, as in that form of club-foot, which has been designated Pes equinus.†   When he attempted to stand, his toes only came in contact with the ground ; and if, while he was seated, his feet were placed flat on the ground, and kept so, on making an effort to rise he fell backwards.   The skin over the tendo-Achilles was in both ankles the seat of an extensive bruise mark.

We have stated that the skin of the swelled and indurated calves and hams, sometimes retains its natural colour ; this seems to depend on the effusions taking place beneath the fascia, without involving the subcutaneous cellular tissue.   But even in such cases the skin is thickened and brawny, as if infiltrated with the fibrin of the blood, and is firmly adherent to the parts beneath.‡

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* This does not depend on the skin being stretched.   We have found the skin adherent in this way over the calf when the latter has been very slightly swollen, and but little larger in circumference than the calf of the opposite leg, which was unaffected.

† Similar cases have been noticed by Baron Larrey, *Mém. de. Chir. Militaire*, tom. ii.

‡ Occasionally, when a scorbutic person has received a slight blow or contusion, there is an

The situations we have mentioned are not the only ones in which such effusions take place; they occur also very frequently between the periosteum and bones, causing node-like swellings, which are often exquisitely tender. We have met with these on all the long bones of the lower extremities, but most frequently on the tibiæ; they often occur also on the rami of the lower jaw, where they are marked by swelling of the lower part of the face, following the outline of the jaw, and by great tenderness on pressure; and in one instance we have seen a swelling of the same kind, on the roof of the mouth, occasioned by an effusion under the periosteum of the palate bone.

The effusions, whether of blood or of fibrin, are never followed by suppuration, and, when they exist between the periosteum and bone, do not, however great their extent, lead to exfoliation of the bone. Under the influence of appropriate general treatment they become absorbed: the petechiæ and bruise-marks on the skin disappear in the same manner as when occurring in ordinary circumstances: when the effusions are more deeply seated, the absorption of them is marked by diminution of swelling, and of pain when the limb is moved: the node-like swellings of the periosteum become rapidly less tender, diminish in size, continuing, however, for some time to pit on pressure, and gradually disappear.

The extent to which these effusions take place is very variable; although occurring under the influence of slight, often inappreciable causes, they seem in some degree accidental, and do not afford a correct measure of the severity of the disease. Swelling and contraction of the ham, for instance, is often witnessed in one leg only, and sometimes at an early period, while in other cases, even in advanced stages, it does not exist at all. Like variation is observed, in the extent and number of petechial spots, bruise-like marks, and nodes, and in the time of their occurrence.

It is to the effusions, especially to those between the periosteum and bones, that we must ascribe the pains scorbutic persons suffer. These pains are confined to the parts in which effusions exist, and are consequently most common in the legs and jaws;[*] they are not increased by the heat of the bed, and are not more severe at night than by day; the patient, when quite still, is at ease, but the exertion of walking, and, in advanced stages of the disease, even the act of turning in bed, or any attempt to move the affected limbs, is productive of great suffering.

If a scorbutic person have any wounds or ulcers, these assume a peculiar aspect. At first, the discharge from them is thin and sanious; later in the disease it coagulates, forming a dark crust which adheres to the surface of the ulcer, and is with difficulty separated from it. If this separation be effected, the ulcer is apt to bleed, and the crust, which consists chiefly of coagulated blood, is formed again in a few hours. Underneath this crust the surface of the ulcer is soft and spongy; and livid, fungoid granulations sprout up at its edges. In a still more advanced stage, the surface of the ulcer is covered with a soft dark coagulum, which, when scurvy was more common than at present, was familiarly termed by sailors *bullock's liver*, from its resemblance in colour and consistence to that substance boiled. This coagulum often rises in course of a night to a size that would scarcely be credited, and if destroyed by cauterization, or the knife (in which case copious hæmorrhage generally ensues), it is reproduced in a few hours, appearing at the next dressing as large as before. (*Lind.*) The slightest wounds and scratches, which in ordinary circumstances would be scarcely noticed, are apt in scorbutic persons to degenerate into ulcers of this description. These ulcers continue without much change until the scorbutic habit is corrected. It is worthy of remark, that they rarely become gan-

effusion of actual blood under the integument, or between the muscles; but this forms a soft, indolent tumour, and remains liquid until it is absorbed. It is very different from the ordinary effusious in scurvy, which are painful and solid from the commencement.

 * Headache, properly so called, is rarely, if ever, experienced by scorbutic persons.

grenous, and that they may exist for a long time on the spine of the tibia, and other parts, without affecting the bone.

Not only wounds and ulcers, but all eruptions on the skin, particularly when seated on the lower extremities, assume in scorbutic persons a livid or purple colour. It is the modification produced by the scorbutic habit in these cutaneous affections, that in many instances certainly has given rise to the varieties described by authors as lichen lividus ;* ecthyma cachecticum, &c.

The symptoms we have described are all the effects of a common cause, but have no mutual dependence, and the order of their succession is not constant. When the scorbutic habit is established, parts previously debilitated are the first to assume the characters peculiar to scurvy. If, for example, the patient have lately been mercurialized, it is in the condition of the gums that the disease will be first manifested ; if he have recently suffered a sprain of the ankle, that part by becoming swelled, painful, and soon after covered with ecchymoses, will give the first token of scurvy ;† if he have any ulcers, or eruption on the legs, these will be the first to put on the scorbutic appearance even before a change in the complexion has led to a suspicion of the disease.

The pulse in scurvy is generally slower and more feeble than in health, and the patient is frequently chilly ; but occasionally, especially when the disease is far advanced, we find the skin hot, and the pulse attaining, or even exceeding the rate of 120 a minute. This variation in the temperature of the skin and in the frequency of the pulse, has given rise to the designations *hot*, and *cold* scurvy ; and for a long time it was imagined that there was some essential difference between these forms. In all the cases in which we have witnessed quickness of pulse and heat of skin, there have been effusions between the muscles, or between the periosteum and bones : the tumours caused by these effusions were exquisitely tender, and the slightest movement of the limbs occasioned great suffering. It is to an inflammatory action, connected with the presence of these effusions, that we are inclied to attribute the fever in such cases.‡ (*Lind*, p. 390. 2d ed.)

The natural secretions are scanty. There is suppression of perspiration, and the skin is dry and rough, and of the aspect, which has obtained the popular designation, " goose-skin." This, however, is not universally the case : the skin of the swelled legs in most frequently smooth and shining, from distension ; and we have met with one instance in which, at an advanced stage of the

* Willan remarks, that in this variety of lichen the papulæ, which are found chiefly on the extremities, are sometimes intermixed with petechiæ, or with larger purple patches and vibices. He notices the affinity which it has to scurvy, and which is shown by its arising under similar circumstances, and yielding to the same mode of treatment. (*Cutaneous Diseases*, p. 15.)

Biett says that in this form of lichen, which occurs in persons weakened by distress and privations, the papulæ are seated chiefly on the lower extremities, and are often mixed with purple, or hæmorrhagic spots. He observes that it is extremely rare. In the time of Willan it was probably much more common in England than in France, for the reasons we have stated when speaking of the causes of scurvy.

† We have more than once observed, in sailors admitted into the *Dreadnought* on account of scurvy, an extensive bruise-mark on the knee or ankle, to which a blister had been applied some time previously under the idea that the pains which the patient suffered in the limb, and which were in reality scorbutic, were owing to inflammation affecting these joints. In such cases the blister rises well, discharges serum as usual, and heals readily ; but in the course of some days the patient finds the part tender to the touch, and by observing that it is the seat of an extensive deep violet-coloured spot, first discovers the real nature of his complaint.

‡ In such cases, when blood is taken from the arm, the clot contracts firmly, and has a buffy coat. The effusions between the muscles, and under the periosteum, which are so common in scurvy, do not result from simple hæmorrhage. The fluid poured out is not pure blood, which always remains soft, and in some measure liquid ; nor serum, which causes œdema ; but a fluid, which *glues the parts together*, and gives a feeling of hardness. It can be no other, therefore, than the fibrinous portion of the blood ; mixed, it may be, with a small proportion of the other constituents. The process is not wholly passive, but gravitation seems to have something to do with it, and the state of the blood still more. With these conditions, the process may properly be called inflammatory.

disease, the patient was subject to profuse sweats, a peculiarity for which no-thing in his history enabled us to account. After he came under our notice, he was plentifully supplied with lemon juice, which seemed to increase the perspiration, so that at the end of two days his chest was found covered with sudamina.

The urine is transparent, but high-coloured and scanty : it is, however, quickly restored to its normal condition. We have examined the urine in numerous instances after the patients had drunk freely of lemonade for two or three days, and have then almost uniformly found it nearly natural in colour and quantity ; transparent ; imparting a red tint to litmus paper ; and not losing its trans-parency by the action of heat or nitric acid. The bowels are, in some cases, regular throughout the whole course of the disease ; but they are more fre-quently, and indeed generally, confined. We have met with instances in which the patients have had no discharge from them for seven or eight days. The evacuations present, in general, no remarkable appearances. But, though usually costive, scorbutic persons are liable to occasional liquid stools, which are uncommonly fœtid, and probably consist chiefly of altered blood. The secretion of saliva is generally natural : we have never witnessed a case in which spontaneous salivation occurred. It has been remarked, however, by Dr. Lind and others, that scorbutic persons are very susceptible of the influence of mercury, and that very small quantities of this medicine are sufficient to bring on copious and dangerous salivation. (*Lind*, p. 126. *et alia*.)

The tongue is almost always clean, moist, and pale. In some instances, in which there was unnatural heat of skin, with quickness of pulse, we have re-marked the tongue to be small ; but, when these febrile symptoms are absent, we often find it broad, and its edges indented. The inside of the lips is also clean, smooth, and extremely pale, presenting the aspect which it has in chlo-rosis. The contrast between the pale, bloodless lips, and the livid and spongy gums is very striking. The lividity and sponginess is always *limited to the gums*, ceasing abruptly at the reflection of the lips, and of the mucous mem-brane connecting the tongue and interior of the lower jaw, and seldom ex-tending over the palate to a distance of more than two or three lines from the teeth. In some rare instances, however, the lividity extends nearly all over the hard palate ; but we have never seen either the lips, the inside of the cheeks, the tongue, or the fauces, present any thing but the pallid appearance we have described.

The patient frequently acknowledges a slight degree of thirst ; but the appetite, in almost all cases unattended with fever, continues, even in advanced stages of scurvy, as good as, or better than in health, and the powers of digestion remain unimpaired. Patients have often spoken to us of the sufferings they endured before their arrival in port, from hunger, which the state of their gums did not allow them to appease by their hardened ship's provisions.

In the early stages of scurvy patients generally sleep well ; but when the disease is far advanced, one of the most constant symptoms is indisposition to sleep, for which these persons can often assign no cause.

The intellect is, in all cases, unaffected ; the memory remains clear ; and the patients, though much dejected, talk rationally to the last moment of their lives. Their senses also continue perfect. Sir Gilbert Blane (*Dis. of Seamen*, p. 461) has, indeed, remarked weakness of the eyesight as an occasional symptom, but it is not mentioned by other authors, and must be of rare occurrence.[*] Our own experience furnishes us with only one instance in which any defect of vision was complained of : this was in a man highly scorbutic, and at the same time dropsical from organic disease of the kidney. He died while under our care ; and for a week before his death complained that his sight was dim, and

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[*] Dr. Hulme relates the case of a man affected with scurvy, who could see only in a strong light. He suffered no pain in the eyes, which appeared clear and healthy, except that the pupils were dilated. The pupils were, however, sensible to every variation in the intensity of light. This symptom disappeared with the ordinary scorbutic symptoms. (*Hulme, De Scorbuto*.)

that all objects appeared green. In those cases of scurvy, in which we have remarked the state of the pupils, we have generally found them dilated.

We have already spoken of the debility, and the tendency to swoon, in persons affected with scurvy. In high degrees of scurvy this tendency is so great, that the slightest motion, the erect posture even, occasions fainting, which sometimes proves fatal. The fact that scorbutic persons not unfrequently expire suddenly, on any exertion of strength, has, indeed, been noticed by all writers on scurvy, as constituting one of its most remarkable features. It is well expressed in the following passage, which we have quoted from the narrative of Lord Anson's voyage :—" Many of our people, though confined to their hammocks, ate and drank heartily, were cheerful, and talked with much seeming vigour, and in a loud, strong tone of voice ; and yet, on their being the least moved, though it was only from one part of the ship to another, and that in their hammocks, they have immediately expired ; and others, who have confided in their seeming strength, and have resolved to get out of their hammocks, have died before they could well reach the deck. And it was no uncommon thing for those who could do some kind of duty, and walk the deck, to drop down dead in an instant, on any endeavours to act with their utmost vigour ; many of our people having perished in this manner during the course of this voyage."

When the disease is considerably advanced, the breathing is often quicker than natural, the inspirations attaining the rate of twenty-four to twenty-six in a minute, without cough or complaint of pain. We have generally found this symptom of the frquency of the act of breathing associated with increased frequency of the pulse. Occasionally, in the latter stages of the disease, the breathing is still more rapid, the inspirations thirty-six a minute, or more, and the patient has cough, and expectorates frothy mucus, or a transparent fluid of mucilaginous consistence. Towards the close of the malady the dyspnœa sometimes becomes extreme. When speaking of the morbid anatomy of scurvy, we shall give the details of a case in which this circumstance occurred.

We have recently practised auscultation and percussion on six patients under our care at once, affected with scurvy in a high degree ; and with the same result in all. The chest was every where unusually resonant, and the respiratory murmur louder than natural, and pure.* The sounds of the heart were loud and extensive, but unaccompanied by any morbid bruit. In these cases the condition of the abdomen was observed at the same time ; in all it was soft and flaccid, and without tenderness on the strongest pressure ; in none could the liver or spleen be felt below the false ribs.†

We have already mentioned, that parts previously debilitated or injured are especially prone to assume the scorbutic appearance. Our own experience furnishes us with two instances which may serve as illustrations of this fact. The first occurred in a man, aged 60, who was admitted into the *Dreadnought*, on the 18th of April, 1837, in the last stage of scurvy. On the middle of his left shin was a livid spot, larger than the palm of the hand, and in the centre of this spot, a scar, which, he assured us, had been there twenty years, and resulted from a wound caused by the kick of a horse. The second instance was in a man aged 55, who came into the *Dreadnought* on the 4th of June, 1837. The right foot was swollen and painful, and all the outer part of that foot and ankle was the seat of an extensive bruise-mark, which surrounded a scar occasioned by a blow he received in 1813.

In high degrees of scurvy it is not unusual for ulcers, long healed, to break

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* The unusual resonance on percussion of the chest, results probably from an anæmic condition of the lungs. (See cases in the chapter on the MORBID ANATOMY OF SCURVY.)

† An account, published by Dr. Mead, of the dissection of a man who died of scurvy, and whose spleen weighed five pounds and a quarter, has, from the dearth of facts, illustrative of the morbid anatomy of scurvy, been quoted by many subsequent writers. This man, who came from Sheppey, was affected with ague as well as with scurvy ; and it is, unquestionably, to the former disease, that the very large size of the spleen must be ascribed.

out afresh. Lord Anson relates the case of a man on board the *Centurion* who had been wounded fifty years before at the battle of the Boyne. " His wounds soon healed, and had continued well for many years, when, in the progress of scurvy, they broke out afresh, and seemed as if they had never been healed ; nay, what is still more extraordinary, the callus of a broken bone, which had been completely formed for a long time, was found to be hereby dissolved ; and the fracture seemed as if it had never been consolidated."

A case in which bones consolidated after fracture became disunited in the progress of scurvy, is mentioned by Dr. Mead ; and not long ago an instance of the same kind was witnessed in a patient in the seaman's hospital, *Dreadnought*. This man, while in China, broke one of his ribs, which united in the usual time ; in the voyage home he became scorbutic ; the rib which had been broken, became disunited, and was so on his arrival in this country, when he was admitted into the *Dreadnought*. On his recovery from scurvy, the rib speedily united again.

Another symptom, somewhat allied to the preceding, is mentioned by authors as occurring in children and young persons, in advanced stages of scurvy ; namely, separation of the epiphyses, from bones. (See *Phil. Trans.* for 1669 and 1670.) No instance in which this occurred has ever fallen under our own notice, and the symptom has not been remarked by naval physicians ; a circumstance unquestionably owing to the mature age of the generality of sailors.

Although it is not unusual for ulcers that have been long healed to break out afresh in persons affected with scurvy, there is very little disposition to become ulcerated in parts that have not previously been so. We have often had to treat scorbutic patients, who had been confined to their hammocks six or eight weeks, and during that time had been scarce able to change their posture by reason of the pains occasioned by any attempt to move the legs ; but we have never met with an instance, in which sores were produced by lying. We have at present under our care a man who has recently come from the Mauritius, in a vessel in which all the crew were in a dreadful condition from scurvy. On his passage outwards, seven months before he was received into the *Dreadnought*, he became hemiplegic ; the paralysis of the arm and leg was complete, and he was quite unable to sit up in bed ; his urine and fæces also passed involuntarily. Notwithstanding all this, he had no sores on the sacrum, hips, or any other part of his body.

In advanced stages of scurvy we have generally found patients much emaciated. This, however, is not always the case ; we have even met with an instance, in which, up to the last period of the disease, the patient had experienced no loss of flesh. Loss of flesh is not dwelt on by authors among the symptoms of scurvy. The persons in whom we have observed it were sailors, who had nothing to eat but hard salt beef and ship biscuit, which they could not masticate from the state of their gums. Many of them have assured us that, although hungry, they have often passed the entire day without eating.

Anatomical characters. Notwithstanding the great mortality occasioned by scurvy, and the attention it excited up to the present century among the most distinguished physicians, very little is known of its morbid anatomy. The records that we possess of dissections of persons, dead of this disease, are very few ; and in these, the terms in which the state of organs is described are often vague, and leave us in doubt as to the meaning they convey. At the present day scurvy very seldom proves fatal, except at sea, in ill-equipped vessels ; so that opportunities of supplying this deficiency in former treatises on scurvy, are extremely rare.[*]

We have had an opportunity of examining the state of the organs in three subjects only, who at the time of their death were affected with scurvy. In the

* For dissections of subjects who died of scurvy, see *Narrative of Lord Anson's Voyage ; Phil. Trans.* for 1669 ; *Dict. des Sc. Medicales*, art. SCORBUT ; Rouppe *De Morbus Navigantium.*

first of these instances, the patient, John Rumney, twenty-five years of age, died soon after his admission into the *Dreadnought*, simply of scurvy. He had come from the Mauritius in a vessel in which scurvy prevailed to such a degree, that one-half of the men before the mast had died of it in their passage homeward, and the rest were so disabled that, for some time before they arrived in port, the vessel was worked entirely by the officers.

The following were the appearances noticed in an examination made twenty-five hours after death :—

The body was much emaciated ; the extremities were rigid ; and on the back there was an extremely faint violet stain.

The mucous membrane of the œsophagus was pale and healthy. The stomach was large ; its mucous membrane in the splenic extremity was thin and soft, and presented a dark gray stain in lines (apparently folds of the stomach) ; elsewhere, it was pale, of natural thickness and consistence, not mammellated. The duodenum contained a fluid tinged with a yellow bile ; its mucous coat was pale and healthy. The mucous membrane of the small intestines, in all their extent was pale, and had no appreciable alteration in thickness or consistence. Many patches of Peyer's glands were very conspicuous, from being dotted with black points, and of a darker cast than the surrounding membrane ; but they had no unnatural thickness or softness. The coats of the jejunum offered, here and there, some dark (blackish) spots, about the size of split peas ; the mucous and peritoneal coats, when stripped off, were free from this stain, which was confined to the intervening muscular coat of cellular tissue, and which probably resulted from ecchymoses. There were none of these discolorations in the ileum. The contents of the small intestines were natural.

The large intestine was filled with solid fæces of a light yellow colour. Its mucous surface presented a blackish or dark gray stain in variable degrees ; this stain was found to involve the mucous coat, which offered a few small, scattered, and very superficial ulcerations. Some of these ulcerations occupied the centres of stained spots, while others, as well as the surrounding mucous membrane, were perfectly pale. In the lower portion of the large intestine was some viscid mucus (probably resulting from the irritation of scybala), adherent to the mucous coat. The external surface of the large intestine, though in much less extent than the internal, also presented some blackish stains ; these stains were confined to the peritoneal coat, which, on being stripped off, retained this colour. There was no *general* discoloration of the peritoneum ; no enlargement of the mesenteric glands ; no blood in any portion of the intestinal canal.

The liver was of nutmeg appearance (colours contrasted, buff, and red) ; of normal consistence, and 3 lbs. 9 oz. avoid. in weight. Liquid blood issued from some large vessels divided by incision. The gall-bladder contained some *yellow* bile of the consistence of thick syrup.

The spleen was soft, of a plum colour, and weighed ten ounces and a half. By squeezing it, the fluid portion was made to exude, and a whitish spongy mass was left. The *pancreas* was perfectly natural ; the *parotid* also.

The larynx and trachea contained a white, frothy fluid ; their mucous membrane was pale and healthy. Both lungs were united to the pleura costalis by old adhesions, which were infiltrated with serum ; and both of them were very pale, and remarkably œdematous. When they were cut into, there was an abundant flow of serum, which could be seen streaming from minute bronchial tubes ; these were readily distinguished from the veins, which gave issue to liquid blood. The lower lobes of both lungs, on account of the œdema, gave no crepitus on pressure, but had a tough, doughy feel ; there was no softening of their tissue, and all the serum could be squeezed out. The heart was about the size of the fist, and when emptied of its contents, 8 oz. avoid. in weight ; it was flabby, and its muscular tissue remarkably pale ; the proportions of the cavities were natural, as well as the thickness of the parietes, the valves perfectly healthy ; the lining membrane of the heart and of the vessels, pale. In the left auricle was a white, fibrinous clot, which was firm, and of the size of a

nutmeg, with threads which extended into the vessels. In both cavities on the right side were larger white clots with threads; in the left ventricle, only a few small portions of fibrin, entangled in the chordæ tendineæ of the mitral valves. The pericardium, which had its usual polish, contained some ounces of limpid serum.

In the large veins the blood was thin and liquid.

The kidneys were pale but healthy; the weight of each, $6\frac{1}{2}$ oz. A catheter was introduced into the bladder, and some urine drawn off, which was transparent, acid, and free from albumen.

The surface of the brain was very pale, and presented considerable effusion of serum under the arachnoid. When the hemispheres were sliced, the surface of the incisions offered some bloody points; there was no softening of the cerebral substance. The choroid plexuses were very pale, and each lateral ventricle contained some colourless serum. The pectoral muscles were of good colour; the temporal, and the muscles of the thigh, paler than natural. There was no œdema of the legs, no swelling and hardness of the calves, an alteration so frequent in scorbutic persons. On the left tibia was a node-like swelling, which had attracted our attention during the lifetime of the patient. This leg was injected with size, before it was examined; the injection was very successful, the fluid employed returning by the veins, and imparting a vermilion colour to the integument. On cutting down over the tibia, there was found under the fascia, a thin layer of coagulated blood, but no sensible extravasation of the size, and no injection of the clot. On cutting deeper, the periosteum was found to be separated from the bone, for the length of six or seven inches, by solid fibrinous effusion or clot, of chocolate colour, and a line or two in thickness. On the periosteal and osteal surfaces of this clot, there was a slight extravasation of the size, but the clot itself was beautifully injected. Small injected vessels could be seen in the clot by the naked eye, and by aid of a glass they were very manifest. When the periosteum, which was itself thickened and infiltrated with blood, was gently stripped from the clot, many threads were seen to pass from one to the other; these were evidently vessels, and some of them filled with size. On stripping the clot from the bone, some vessels were also seen filled with size, coming from the former, and entering the latter; but the vascular connexion of the clot and bone was much less than that of the periosteum and clot. The clot in question surrounded the tibia, with the exception of the ridge on the anterior and outer surface of the bone; on this ridge the periosteum adhered to the bone, but could be readily stripped from it. A few lines beyond the limits of the clot the periosteum was perfectly natural in appearance, and adhered to the bone with its usual firmness.

The bone itself did not appear diseased; it was firm, and resisted the saw as much as usual. The membrane lining the medullary canal was well injected, and the bone itself was injected in a slight degree.

There were other clots separating the periosteum from the bone, on the fibula of the same leg; one on the femur, some on the tibia of the opposite leg.

There was no extravasation of the size that could be detected by the naked eye, on the integument or between the muscles; in fact, none except that already mentioned between the periosteum and bone. The periosteum was separated by a clot from the bone of the lower jaw in its whole extent, except at the attachments of the temporal and pterygoid muscles; at the neck of the bone on each side; and also in a space, about an inch in breadth, inside and out, at the chin. The attachments of the genio-hyo-glossi were preserved; those of the mylo-hyoid on both sides destroyed.* Where the periosteum was detached from the bone, the intervening clot was black, and a line or two in thickness. A considerable portion of the gum, immediately surrounding the teeth, had

* Dr. Cook, in a letter to Dr. Lind, describing the scurvy that prevailed in the garrison at Riga, in the spring of 1751, says, "their rotten gums gangrened, as also their lips, which dropped off; the sphacelus spread to their cheeks and the muscles of their lower jaw; and the jaw-bone in some, fell down upon the sternum." (*Lind*, p. 280.)

sloughed. The bone had a dark stain in a space extending three or four lines from the edges of the alveoli; elsewhere it appeared healthy. There was no caries.

On the upper jaw also the periosteum was separated from the bone by a dark clot, which extended as high as the zygoma.

In portions of the bones of the leg or face, where there were no clots, the periosteum was healthy, and firmly adherent.

There was no effusion between the muscles of the face; no enlargement of the salivary glands. There was a considerable ecchymosis between the muscles covering the abdomen.

In this patient scurvy existed almost without complication. Before its accession, indeed, he had taken mercury, which, perhaps, rendered the state of the gums than it would otherwise have been, but which did not modify in any other way the progress of the disease. The great emaciation was probably occasioned by abstinence from food; for some time before his admission to the *Dreadnought*, he had nothing to eat but hard salt beef or pork, and ship biscuit, which, for many weeks, he must have been unable to masticate. To the same cause we may perhaps ascribe the softness and thinness of the mucous membrane of the stomach. Œdema of the lungs, and the extreme debility to which he was reduced, seem to have been the immediate cause of his death.

After death, the chief morbid appearances, observed in the organs of digestion, were softness and thinness of the mucous coat in the splenic extremity of the stomach; an alteration which the good appetite and the power of digestion, usually possessed by scorbutic persons, would lead us to suppose occurs seldom in scurvy; small, superficial ulcerations of the mucous membrane of the large intestine; and blackish stains in the muscular coat of the jejunum, and in the mucous and peritoneal coats of the large intestine. The comparison of this case, with the two following, renders it very probable that these stains are referrible to the scorbutic habit, and that they resulted from hæmorrhages, the tendency to which is so characteristic of scurvy. It is worthy of remark, that no traces of disease were observable in the mesenteric or salivary glands. The bile, instead of being of its usual olive colour, was *yellow;* it is probable that this alteration in the character of that secretion resulted also from the scorbutic condition, and it may perhaps serve to explain the constipation so often remarked in cases of scurvy, as well as the peculiar cast of complexion in persons affected with this disease.

In the lungs the only morbid change was the œdema, which must have taken place in the last days of life; and, with the exception of paleness and a flabby state of the heart, no appearances of disease were discovered in the central organs of circulation. Nothing was remarked of the state of the blood, except that it was thin and fluid in the large veins. That it was deficient in quantity, at least of red particles, was shown by the faintness of the violet stain on the back at the end of twenty-five hours after death; by the paleness of the muscles, and of the mucous membrane of the intestinal canal in its whole extent, of the mucous membrane of the bronchi, of the pulmonary tissue, of the brain and choroid plexuses, and of the kidneys; as well as by the paleness of the tongue, and mucous membrane of the lips, observed during life. The fibrinous clots in the ventricles show, however, that it had not lost the property of coagulating: it is also worthy of remark, that it had imparted no stain to the lining membrane of the heart or vessels. But the most singular fact which this dissection discloses is the presence of clots between the periosteum and bones of the jaws and lower extremities. Painful nodes on the tibiæ, and swellings along the lower jaw, have been mentioned by many writers as symptoms of common occurrence in advanced stages of scurvy; but we are not aware that the cause of them has ever before been ascertained. The persistence of the vascular connexion of the periosteum with the bone, through the clot, renders it probable that the effusion took place very gradually, and serves also to explain the circumstances, noticed by Dr. Lind, that, although scorbutic nodes continue a long

time on the tibiæ, they never give rise to exfoliation of bone. The fact that, notwithstanding the force used in injecting the leg, there was no extravasation of the size, that could be detected by the naked eye, on the integument, in the subcutaneous cellular tissue, or between the muscles, affords an argument in support of the opinion that the hæmorrhages in scurvy result more from a change in the blood than from weakness of minute vessels.

In the second fatal case the patient, æt. 23, was admitted into the *Dreadnought*, immediately on his arrival from Calcutta, and was affected with albuminous dropsy, as well as with scurvy. At the time of his admission his legs were sprinkled with petechial spots, and his gums formed a black, spongy mass, which completely concealed the teeth. He was tapped two days after his admission, and three gallons and a half of serous fluid, slightly tinged with blood, were drawn off. This produced temporary amendment, but at the end of some days inflammation of the pleura supervened, and he died a fortnight after his arrival in this country. The following notes were taken of the morbid appearances. The body was very œdematous. In the cellular tissue, under the lower portion of the great pectoral muscle on the left side, and above the ribs, there was an infiltration of pus, which had no communication with the pleura.

The lower lobe of the left lung was united to the pleura costalis and diaphragm by very soft adhesions; the false membranes that formed these adhesions were imbued with pus, and the pleural cavity contained a considerable quantity of turbid serum. The pleura costalis presented a mottled rosy appearance: the lung itself was healthy. The cellular tissue over the pericardium was infiltrated with pus. The pericardium contained a small quantity of serum, and had its usual polish, except on the surface of the heart, where there were a few thin shreds of false membrane.

The heart was natural in size; the parietes of the left ventricle thickened; in other respects it was normal. The valves were quite healthy.

The right lung was healthy, but somewhat compressed by a considerable quantity of colourless serum in the pleural cavity.

There was no appearance of inflammation about the puncture made by tapping. The intestines, which (especially the large) were much inflated, presented on the outside a blackish-green, or dark olive tint. The peritoneal coat, when stripped off, was almost uniformly of this colour. The mucous membrane of the stomach presented in the splenic extremity a similar dark-green colour, in spots about the size of pins' heads. In the pyloric extremity, which did not offer this colour, there was a bright blood-red mottling, which resembled in every thing but colour the mottling in the splenic extremity. The mucous membrane of the small intestines appeared as if sprinkled with a fine dark green powder; the coloured points were in the villi. There was nowhere any change in the consistence of the mucous coat.

The liver was large, and its convex surface presented some ecchymoses; its tissue was pale, and both colours blended.

The spleen was natural in size, and readily broke into a pulp under the finger; the pancreas, natural.

The kidneys were large, and lobulated externally. The cortical substance, of a dull white, contrasted strongly with the medullary, which was of a pale pink colour.

In this case there was a general discoloration of the peritoneum, like that observed in patches on the large intestine in the case of Rumney. The dark green spots on the mucous membrane of the stomach and small intestines were also unquestionably analogous to the stains in the mucous membrane of the large intestine of Rumney. The blood-red mottling in the pyloric extremity of the stomach, which resembled in every thing but colour the mottling in the splenic extremity, goes to prove that the latter was of the same character with the former, but of earlier date. The presence of pus in the cellular tissue and on the pleura shows that, although acute inflammation seldom occurs in scurvy,

the scorbutic habit is not incompatible with the existence of inflammation in its highest degree, and does not prevent the formation of its usual products.

The dropsy and albuminous urine in this case are undoubtedly referrible to disease of the kidneys. It is worthy of remark that, notwithstanding the great tendency to hæmorrhage in scurvy, we have never met with an instance in which blood was observed in the urine; and in more than twenty cases of scurvy we have tested the urine by heat and nitric acid, without finding it albuminous in a single instance, except in the case of Williams.

There was a circumstance noticed in this case which shows the specialty of the morbid changes which constitute scurvy. We allude to the improvement in the state of the gums in Williams, after he was liberally supplied with oranges. This improvement, notwithstanding his general condition, was as rapid as we have ever witnessed it.

In the third fatal case, the patient, aged sixty, had been twenty-one years in India, a soldier in the Company's army. His health had been somewhat impaired for two or three years before he left India; and soon after he entered on his homeward voyage he became affected with scurvy in a high degree. He had a very severe rigor, and died, apparently from exhaustion, soon after he arrived in this country.

Inspection six hours after death. The body was of a dusky olive colour; of robust figure, and not emaciated. The skin of the extremities sprinkled with black spots, some of them as large as a shilling, which were found to depend on coagulated blood. The muscles unusually pale.

The lungs were remarkably bloodless, and very much collapsed, presenting no trace of disease. The heart was very large; the right cavities were much dilated, without hypertrophy, and contained soft fibrinous coagula; the left ventricle was thickened, its cavity not dilated. The pericardium and valves, as well as the aorta, were quite healthy.

The mucous membrane of the stomach was of a rosy tint. The small intestines, which were much contracted, were very pale, and offered here and there a small ecchymosis under the peritoneal coat. The large intestine was so contracted as scarcely to admit the finger; its mucous membrane was much thickened, and every where of a strawberry tint, except in the cæcum, where it was of a mottled olive colour. There was no ulceration in any part of the intestine.

The liver was large, and very friable. The gall-bladder was much distended by a yellow, ochry fluid; and contained also eight calculi, about the size of small peas, of dark olive colour, and all regular tetrahedrons in figure.

The spleen was large, and broke into a pulp under the finger; its capsule was readily stripped off.

The kidneys were pale; in other respects normal. The urinary bladder contracted.

There was a great quantity of transparent serum under the arachnoid, and in the ventricles; the cerebral substance was pale, in other respects normal. Thin fluid blood escaped when the large vessels in the neck were divided.

In this case the mucous membrane of the cæcum presented the same mottled olive colour that we have noticed in the dissections in the former cases. The origin of this colour is also indicated in this case by the strawberry tint of the mucous membrane in the remaining portion of the large intestine, and by the ecchymoses under the peritoneal coat of the small intestines.

The contents of the large intestine were not noticed. The manner of his death, and the state of the large intestine, render it probable that intestinal hæmorrhage had taken place.

The condition of the liver, and the contraction of the colon with thickness of its coats, serve to explain the impaired state of the patient's health before he left India.

The general inferences to be drawn from the preceding facts are, that in the *inspection* of the bodies of persons who die of scurvy, the chief indications of that disease are met with in the colour of the skin, in the state of the gums, and

in the presence of fibrinous effusions, and of ecchymoses or effusions of blood. These effusions occur most frequently in the skin, in the subcutaneous cellular tissue, and between the muscles of the lower extremities ;* between the periosteum and bones of the lower extremities and of the jaws ; and in the peritoneal coat, and in the muscular and mucous coats of the intestinal canal. The numerous traces of hæmorrhage observed in the coats of the intestines are in accordance with the frequency with which scorbutic persons pass blood by stool.

The change observed in the complexion is referrible to the state of the blood ; and we have already mentioned a fact which supports the opinion that the hæmorrhages also mainly depend on the same cause. Our observations, however, furnish us with no direct information respecting that fluid, except that it is deficient in red particles ; that it has not lost the property of coagulating ; and that it does not impart a stain to the lining membrane of the heart or vessels.†

Beyond a general paleness of tissue, there is no change characteristic of scurvy observable in the brain ; in the organs of respiration ; in the heart or large vessels ; in the glandular system (except perhaps in some of the secretions) ; or in the bones.

The cases which have been recorded of the disunion, during the progress of scurvy, of bones which have been consolidated after fracture, and the separation of the epiphyses from the bones, mentioned by authors as sometimes occurring in young persons affected with this disease, seem indeed to lead to the opinion that the bones themselves may become affected in scurvy. A case, however, lately published by Dr. Godechen, of a scorbutic patient who died in 1834, in the marine hospital at St. Petersburg, serves to explain the process by which the disunion and the separation in question are effected. During the lifetime of this patient it was observed that some of his ribs were dislocated from their cartilages, and that several others were fractured near their anterior extremities. These fractures occurred without violence, some of them even during his stay in the hospital. Examination of the fractured ribs, after death, proved that the periosteum was stripped from their bodies to the extent of half an inch on each side of the seat of fracture ; and that a sort of pouch, which was filled with soft dark-red coagulum, containing small fragments of bone, had been formed around the fractured extremities of each bone. The surfaces of the fracture were rough, but not splintered ; and the neigbouring costal pleura presented no appearance of inflammation. At those spots where separation of the cartilages from the ribs had taken place, like changes had occurred ; the extremities of the cartilages being further softened, but neither remarkably rough nor thickened.‡

Although it is not so stated in the account given of this case, we have little doubt that the ribs of this patient had been fractured at some former period, and that, as in a case we have already mentioned, and also in the one recorded by Dr. Mead, a disunion of the consolidated fractures took place in the progress of scurvy. The process seems to be, effusion of blood between the periosteum and bone, and consequent destruction of the vessels which serve to nourish the bone.

Such are the morbid changes which we discover by dissection in the bodies of those who die of scurvy. They are in themselves interesting, but we arrive at much more important information respecting the nature of this disease, by consideration of the circumstances detailed in former chapters. When we reflect that the exclusive cause of scurvy, is prolonged abstinence from the juices of succulent plants and fruits ; that by the use of these it may always be prevented ; and that, when it exists even in its highest degree, it may be speedily

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* The greater frequency of effusions of blood in the lower extremities, is probably owing to gravity.

† This confutes an opinion, expressed by an eminent physiologist, that in scurvy the globules of the blood are dissolved in the serum. (See *Müller's Physiol. Trans.* p. 257.)

‡ See a notice of this case, (which was originally published in *Zeitschrift für die gesammte Medizin*, band vi. heft i.), in the *British and Foreign Medical Review*.

cured by the same means, the inference is plain, that these juices contain some
element essential to the formation of healthy blood ; and the history of scurvy
shows that they cannot be replaced by any of the other elementary nutritive
substances from the vegetable kingdom ; such as starch, mucilage, oils, albu-
men, gluten ; or by any of the elementary nutritive substances of animal
origin. The powers of digestion in scurvy are not impaired, but the materials
on which they act are deficient in necessary constituents, and the blood formed
from them is imperfect. This imperfection of the blood is the source of all the
symptoms and the cause of all the morbid anatomical changes which are
observed in scurvy. We have already considered at great length the variety
and serious nature of the former, and the peculiar character of the latter. The
study of scurvy is, therefore, most instructive to the pathologist, showing as it
does the variety and importance of the effects which may result from a primary
alteration in the quality of the blood, independently of any morbid change in
the solids. The history of its treatment further shows how quickly that fluid
may be restored to a healthy state, when its morbid quality does not depend
on any vitiation by poison, but simply on a defective supply of some of the
elements necessary for its formation.

　　The exact difference between the composition of healthy blood and that of
the blood in scurvy is not known to us by direct experiments ; but the reality
of a change in the blood in scurvy, proved as it is by the foregoing considera-
tions, is sufficiently attested also by the pallid dingy hue of the complexion, by
the state of ulcers, and by the frequency of spontaneous hæmorrhages.* The

* Since this paper has been in the hands of the printer, my friend Mr. Busk has made for
me an analysis of the blood in three well marked cases of scurvy. The result of this analsyis,
which was performed in the manner recommended by Dr. Christison, in his work on granular
kidney, is given in the subjoined table. The fourth horizontal line in this table is introduced
for the sake of comparison, and gives the analysis, by the same method, of blood taken from
a robust sailor, who had slight psoriasis, but was otherwise in good health. This analysis of
scurvy blood, although it does not enable us to say what is the peculiar change of the blood
in scurvy, is sufficient to disprove the prevalent notion that in this disease the globules are
dissolved in the serum. In the blood taken from these scorbutic patients, the separation into
serum and clot was as perfect, and took place as rapidly as in healthy blood. The same fact
has been noticed by Rouppé in his work, *De Morbis Navigantium*. *Trans.* p. 180.

| Case. | Age. | SERUM. | | Clot. |
		Appearance.	Specific gravity.	
1	27	Pale straw-colour.	1·028	Small, firm, buffed, and cupped.
2	33	Ditto.	Not ascertained.	Large.
3	23	Yellow, hazy.	1·025	Small, firm, buffed, and cupped.
4	45	Yellow, straw colour.		Large, sizy.

| In 1000 parts. | | | | |
Water.	Hematosine.	Fibrin.	Albumen.	Salts.
849·9	47·8	6·5	84·0	9·5
835·9	72·3	4·5	76·6	11·5
846·2	60·7	5·9	74·2	10·9
788·8	133·7	3·3	67·2	6·8

general paleness of the tissues shows that there is great deficiency of red particles, and the tendency to swoon, so constant in scurvy, is undoubtedly owing in some measure to this deficiency, for physiologists have shown that the vivifying influence of the blood resides chiefly in these particles. It is evident, however, that diminished proportion of red particles, which is common to many diseases, is not the only nor the most important change of the blood in scurvy.

The cause of scurvy suggests considerations scarcely less interesting than those which arise from a study of its pathology. We here learn the great importance of considering food, not only in reference to digestibility and other qualities, but also as the material from which healthy blood is to be formed. We are of opinion that this point of view is too often overlooked, both as regards public health, and in prescribing diet in individual cases, and we hope these pages may call anew the attention of physicians to this interesting subject. We have seen that the approach of scurvy is gradual, and that prolonged abstinence from succulent vegetables is necessary for its full developement; but it is our opinion that something short of this—that a condition which might be correctly designated a scorbutic taint—must often occur in the lower classes in towns, but especially in prisons and asylums, towards and at the close of long winters, when succulent vegetables are scarce and expensive. Such a condition of the system would necessarily modify the character and course of supervening acute diseases; and it is worthy of the most diligent inquiry whether that form of scarlatina, designated by the epithet *maligna*, and analogous types of other eruptive diseases, may not, in some cases, owe their peculiar aspect and character to the circumstance of a scorbutic taint already existing, when the system becomes subject to the specific poison of these several diseases.*

It appears to us, also, that by the common practice of physicians in many chronic diseases, patients are kept far too long a time on a diet consisting of farinaceous food, or of this with some proportion of animal food. When a moderate use of succulent vegetables is considered prejudicial, it would be advisable to supply the patient with their equivalent, namely, a certain proportion of orange or lemon juice.†

Physiologists have made experiments on animals to ascertain the effect of a diet composed of substances devoid of nitrogen. The condition of the system which this brings on is different from scurvy, and of far more serious nature. It appears from the experiment of Magendie, that after an animal has been kept a certain time on such a diet, the allowing him his customary food does not save him.‡ The contrary is notoriously the case in scurvy, which, as far as we can judge, does no permanent injury to the constitution.

Diagnosis. The history of scurvy shows, more completely than that of any other disease the great practical importance of accurate diagnosis. It was owing

* A fact which renders this probable is, that these types prevail most, during and at the close of long winters. We may here notice the extraordinary prevalence of typhus in the severe winter of 1837, 1838, and the petechial character of that epidemic. Sir G. Blane has remarked, that the low spotted typhus is always most prevalent in long and severe winters. Willan states also, that the malignant form of scarlatina is usually limited to the winter months. The following paragraph from Huxham's *Essay on Small-pox*, may also bear on this subject: " I have never observed either the *vegetable* or *mineral acids* of any great service in the crude crystalline pox, but I have often found them highly useful in the *small, black, confluent kind, with petechiæ.*"

† On the 28th of May, of the present year, a patient was admitted into the *Dreadnought*, presenting the usual symptoms of scurvy. He entered a hospital in Scotland, on the 15th of the preceding November, on account of an injury on the leg, received the same day, and continued there till the 22d of May. During this period, he lived chiefly on oatmeal porridge with milk; but latterly he had four ounces of meat, which he ate with bread, and three ounces of whisky daily. Occasionally he had broth without kale. No potatoes or other vegetables; no beer. The scorbutic symptoms disappeared in a few days, under the free use of lemon juice.

‡ The reader who is desirous of further information on this point, may compare the account of these experiments of Magendie with the description given by Mr. Malcolmson, of the effect produced by a diet of bread and water on the health of prisoners in India. (*Letter on Solitary Confinement*, &c.: by J. G. Malcolmson, Esq.)

to want of it, that scurvy continued to prevail, to a most fatal extent, for two centuries after effectual preventives and remedies had been discovered in the most abundant productions of nature. We have already mentioned that in the earliest accounts of the disease by Ecthius, Rousseus, and Wierus, who wrote in the first half of the sixteenth century, there is not only an accurate description of its symptoms, but an enumeration of many of the vegetables and fruits which at present are the most distinguished for antiscorbutic properties. In the early part of the seventeenth century, however, a work on scurvy was published by Eugalenus, a Dutch physician, who laboured to prove that almost all cutaneous diseases, hypochondriasis, and various other maladies, were merely different manifestations of the scorbutic diathesis, and ought to be considered as one disease. The confusion was made still greater by subsequent writers, until at last physicians had comprehended under the term scurvy, almost every distemper incident to man. Sydenham tells us that, in his time, scurvy and malignity were the subterfuges of ignorant physicians; and Willis, writing in 1679, could make use of such expressions as these :—" Si accidens quoddam inusitatum nec prius auditum in corpore humano eveniat, cum ad aliud certum genus referri nequit, sine dubio statim illud *scorbuticum* pronuntiamus." (*Willis, De Scorbuto,* cap. i. p. 14.)

In the middle of last century Dr. Lind complained much of the same want of accurate diagnosis, and dwelt very impressively on the evils that resulted from it. (*Lind,* Preliminary Discourse, ch. iii.) It is to this author, who, as physician to the fleet, was well placed for observing the uniformity of the disease, that we are indebted for the final dispersion of most of the errors that prevailed on this subject. His patient investigation of the history of scurvy will insure him the rank of a philosophical physician; while his perseverance in forcing on the public notice the means by which it might be prevented, and the beneficial influence which the adoption of these means has had on the condition of a numerous and important class of our fellow-subjects, will ever entitle him to a high place among the benefactors of mankind.

At present, the subject of diagnosis is comprised within very narrow limits. The only disease with which scurvy can be confounded, is purpura. This term, in the language of modern pathologists, is intended to include every variety of petechial eruption, or of spontaneous ecchymosis (see *Bateman* and *Biett*); it consequently comprehends typhus, or petechial fever, scurvy, and probably other distinct diseases, which until we have learned to discriminate between them, we are compelled to group under the generic term, Purpura. Petechial fever, indeed is easily distinguished by the peculiar character of its symptoms from the other diseases, which, by the preceding definition, are included in the same class; but scurvy, and the maladies to which we would restrict the term purpura, are confounded by the best writers on diseases of the skin. They are, however, essentially different; they arise from different causes; they differ in the circumstances and mode of attack; and they require different treatment. We have already stated that the essential cause of scurvy is prolonged abstinence from vegetable juices, and that the approach of the scorbutic habit is very gradual: purpura, on the contrary, often appears suddenly, and in many cases it cannot be attributed to any peculiarity in diet. Scurvy, when occurring on land, is, from circumstances we have before mentioned, met with almost exclusively at the end of winter, or in the early part of spring; purpura, on the other hand, is most common in summer and autumn. The livid and spongy state of the gums, which is pathognomonic of scurvy, and which, as well as the sallow and dusky hue of the skin, is a constant symptom of that disease, is not observed in purpura. Lastly, in scurvy, bleeding always does harm, and the disease is speedily cured by the use of succulent vegetables and fruits; while, in purpura, the abstraction of blood is often followed by relief, and the antiscorbutics are rarely, if ever, productive of much benefit.*

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* This circumstance alone is quite sufficient to prove an essential difference between scurvy

It has been supposed that there are varieties of scurvy, and that scurvy occurring on land is different from that which arises at sea. If, however, we compare the descriptions given by the early writers* on scurvy, who observed it on land, or the cases recorded by Dr. Heberden, with the accounts of naval physicians, we shall perceive an entire agreement in the essential symptoms of the disease. Moreover, it is easy to see that the disease, depending as it does on a single cause, must be identical wherever it occurs.

Treatment. After the details into which we have entered respecting the causes and prevention of scurvy, we have little to say on the subject of treatment. The essential point is to administer liberally those articles of vegetable food, which have been distinguished for their antiscorbutic qualities. Oranges, lemons, or fruits of that class, if they can be procured, should be preferred. Their salutary effect is extraordinary, and such as would scarcely be imagined by persons who have not witnessed it. In the course of a few days, the complexion loses its sallow and dusky hue; the gums become firm and florid; the petechiæ and bruise-marks on the skin disappear; the legs, if swollen and rigid, begin to regain their natural size and pliancy; despondency and muscular weakness are replaced by cheerfulness and a feeling of strength :—in fact, the aspect and condition of the patient soon betoken return of health.

If the state of the gums be such as to prevent the patient from masticating, he should be kept for two or three days on milk diet,† or on soups, in addition to antiscorbutics. At the end of this time, or at the commencement, if the case be less severe, his diet should consist of fresh animal food, with vegetables, especially in the form of salads. As long as he continues very feeble, wine should be freely given him; afterwards, this may be replaced by porter or ale.

In advanced stages of the disease, when debility is extreme, and the slightest exertion produces fainting, the patient should not be exposed to sudden change of air, or be even allowed to sit up in bed without great caution. Before he is moved or permitted to get up, a glass of generous wine, well acidulated with lemon or orange juice, should be given him. This injunction was first made by Dr. Lind, and we have more than once had to regret not having obeyed it.

Sleep should be procured by an opiate by night, which we have often found to produce great comfort.

Constipation, when it exists, may be removed by mild purgatives; and for this purpose none are preferable to moderate doses of castor oil. On account of the great debility, and the tendency to swoon, which in high degrees of scurvy is sufficient to cause alarm, all strong cathartics should be avoided. For the gums we may prescribe an astringent gargle; and none answers better than a weak solution of chloride of lime. For scorbutic ulcers, the best dressing is lint soaked in lemon or lime juice, diluted with two or three times its quantity of water. (*Dis. of Seamen*, p. 468.) The lint when placed on the ulcer, should be covered with oiled silk to prevent evaporation. Firm compression should be avoided, from the tendency it has to produce gangrene. If the legs be much swelled, stiff, and painful, considerable relief will be procured by warm fomentations.

But all these complaints yield readily to the general method of cure, and can only be palliated until that is undergone. Bleeding should never be had recourse to, although acute pains, heat of skin, quickness of pulse, and other febrile

and the diseases to which we would limit the term Purpura. The effect of vegetable juices is so constant and so specific in real scurvy, that we may safely infer that a disease not benefited by them, is of essentially different nature.

* Ecthius, Wierus, or in fact, any writer before the time of Eugalenus. See also *Med. Gazette*, vol. xx. report of Dr. Murray.

† We have no evidence showing that milk is antiscorbutic. Dr. Lind mentions, on the authority of Sinopœus, that scurvy is common among the Tartars, who live chiefly on milk and flesh (*Lind*, p. 246); and we have already noticed its occurrence in the Lunatic Asylum at Moorshedabad, in which milk was regularly supplied to the inmates.

symptoms, or a dangerous hæmorrhage may seem to render it advisable. In advanced stages of the disease patients do not survive it. (*Lind*, p. 216.) Blisters are apt to produce gangrene, and for this reason we should abstain from their employment. (*Larrey, Mém. de Chir. Mil.* tom. ii. p. 288.)

Mercury, in every form, should be religiously avoided: even in very small quantities it has been known to produce dangerous salivation. We have met with instances in which the scorbutic symptoms seemed to have been much aggravated by mercury taken before the scurvy made its appearance. The ill effects of this medicine are indeed noticed by most writers on scurvy; and Kramer, who was physician to the imperial armies in Hungary, from 1720 to 1730, relates that of 400 men, affected with genuine scurvy, to whom, on the advice of Boerhaave, mercury was given so as to induce salivation, not one survived.

In the writings of the physician whose testimony we have just given, is a passage which expresses so pithily and so truly almost all that we can say on the subject of treatment, that we cannot refrain from quoting it. "Scurvy is the most loathsome disease in nature; for there is no cure for it in your medicine-chest; no, nor in the best furnished apothecary's shop. Pharmacy gives no relief, surgery as little. Beware of bleeding: shun mercury as poison: you may rub the gums, you may grease the rigid tendons in the ham to as little purpose. But if you can get green vegetables; if you can prepare sufficient quantity of fresh, noble, antiscorbutic juices; if you have oranges, lemons, or citrons; or their pulp and juice preserved with sugar in casks so that you can make lemonade, or rather give to the quantity of three or four ounces of their juice in whey, you will, without other assistance, cure this dreadful evil." (*Krameri, Medicina Castrensis.*)

DROPSY.

GENERAL DOCTRINES OF DROPSY.

Conditions of the system under which dropsical effusions arise—General pathology of dropsy. —Chemical composition of dropsical fluids.—Remarks on some of the phenomena of the effusion.—Prognosis of dropsy.—General principles of treatment.—Cardiac dropsy.—Indications that dropsy originates in cardiac disease.—Forms of cardiac disease that induce it, and progress of the dropsical effusion.—Renal dropsy.—Peculiar characteristics of this form.—Appearances in the structure of the kidney in renal dropsy.—Relation of renal disease to dropsy.—Condition of the urine—of the blood.—Incidental complications.—Causes of the renal disorganization.—Acute or Febrile Dropsy.—Nature, symptoms, and causes.—Dropsy following scarlet fever.—Treatment of general dropsy—of acute or febrile dropsy—of chronic general dropsy—of the renal form of chronic general dropsy—of cardiac dropsy —of diet and drinks.

Dropsy, strictly defined, consists in the accumulation of a preternatural quantity of watery or serous liquid in some one or more of the natural serous cavities of the body, or in the interstices of the serous cellular tissue; independently of inflammation of the boundaries of those parts.

But the term dropsy has likewise been applied to collections of serous or other liquids in *cysts:* that is, in cavities which are themselves preternatural, which have been formed, or greatly enlarged and altered, by some morbid process.

Serous effusions into the circumscribed cavities of the body are often the immediate results of inflammation of the internal surface of the cavity ; and these also have sometimes, though inexactly, been denominated dropsies. They will be no further noticed in the following dissertation than may be necessary for better understanding and discriminating the watery accumulations that are more properly accounted dropsical. Nor is every collection of serous liquid found in the shut cavities of the dead body, and independent of inflammation, to be considered a dropsy. If the liquid does not exceed a certain measure, and especially if the examination of the corpse has been delayed, as is customary in this country, till twenty-four or thirty-six hours after death, the effusion must not be regarded as a morbid appearance, or as affording any evidence of previous disease. It is a purely physical phenomenon. As vitality ceases the blood accumulates, and ultimately stagnates, in the venous system; the tissues of which the veins are composed become loose and more permeable than during life, in consequence of commencing decomposition ; and the serous parts of the blood transudes mechanically through them with greater facility than before.

It has been said, and said with much truth, that dropsy is rather a symptom of disease, than a disease in itself; and that it would therefore be more philo-

sophical to treat of the original malady on which the accumulated water depends, and to withdraw dropsy altogether from the number of substantive diseases. But the propriety of still regarding dropsies as constituting a genus of disease, and particular dropsies as specific forms of disease, may be defended by the following considerations :—

1. Allowing that dropsy is often, or always, a symptom, it is a symptom which, in many instances, we cannot trace home, while our patient is yet alive, to its antecedent morbid action, nor satisfactorily ascribe to any organic change discoverable after he is dead.

Practically speaking, in such cases the dropsy is the disease, and the sole object of our treatment. Moreover, the liquid accumulation is a symptom very obvious and striking in itself, while it results from various physical alterations, differing both in their seat and in their nature ; and it will be useful to study dropsies collectively, if it be only with the view of analyzing them, and of referring them, as often and exactly as possible, to the pre-existent disease.

Dropsy is, in fact, to a medical eye, in all cases, something more than an effect or symptom of disease. The fluid collection itself is a cause of various other symptoms (συμπτωματος συμπτωματα) ; of symptoms which often constitute the greater part, or the whole, of the patient's distress and danger. The imprisoned liquid by its weight or pressure may embarrass important functions, or even extinguish life. The removal of the dropsy will frequently restore the patient at once to comparative comfort ; or indeed to what, so far as his sensations, and powers, and belief are concerned, is for the time to him a state of health ; although the original bodily cause of which the dropsy was a symptom may remain behind, untouched, to be again productive of similar consequences, under circumstances favourable to its operation.

Sometimes it happens that the bodily change, which is the immediate cause of the dropsy, is slight, or temporary ; while the patient's comfort, and very existence, are compromised by the mere accumulation of the water : and if this accumulation can be remedied by art, its temporary producing cause may cease, or be removed, or admit of compensation, and so the patient may be strictly restored to sound health.

In a dropsical person, then, whose dropsy results from organic disease, there are plainly two sets of symptoms to be distinguished ; namely, those which depend upon the primary disease, and those which are caused by the collection of water. And these two sets of symptoms differ perhaps not only in their gravity and importance, but also in their obedience to treatment. The latter, usually the most grievous, may often be got rid of; the former are frequently but little complained of or felt by the patient, but they are generally permanent.

Dropsy would perhaps be thought, by many, a more attractive subject if it were not so commonly considered incurable. But the preceding remarks may suffice to show that, as far as itself is concerned, it often is curable ; and some of its forms will hereafter appear to be curable in a more absolute sense, the serous collection, and the condition from which it proceeds, both admitting of remedy.

Besides, it is our business and aim to cure when we can : and whether we can cure or not, to remove or mitigate human suffering : and this we are able to do, to a very considerable extent, in many or in most cases of dropsy.

Wherever there is a shut sac, or wherever there is loose and permeable cellular tissue, there we may have dropsy. Thus there may be dropsy of the ventricles of the brain, or of the meshes of the pia mater, producing death by *coma ;* of the cellular tissue of the lungs, or of the submucous tissue of the larynx, both leading to death by *apnœa ;* of the pericardium, causing death by *syncope.* Almost every mode of dying, therefore, may result from dropsical accumulations.

When the cerebral ventricles are distended with water, we express the diseased condition by the term *hydrocephalus.* When serous fluid occupies the

pleura, or the pericardium, we say the patient has *hydrothorax*, or *hydroperi-cardium*. If the cavity of the peritoneum be the seat of the collected water, we call the complaint *ascites*. When the cellular tissue of a part becomes infiltered with serous liquid, the part is said to be *œdematous ;* and *anasarca* is the name given to the more or less general collection of serum in the cellular tissue throughout the body, and especially to visible subcutaneous œdema of much extent. Under the term *general dropsy* we signify the simultaneous existence of anasarca, and of dropsy of one or more of the larger serous cavities.

Certain forms of dropsy—for example, dropsy of the tunica vaginalis testis, or *hydrocele*, dropsy of the joints and bursæ, *hydrarthus*, belong to surgery, and need only to be glanced at for the sake of elucidating the general subject.

Upon the whole, dropsies are common and afflicting diseases : they depend upon various conditions, and require a diversity of treatment ; and whatever light can be obtained respecting their nature, and causes, and remedies, must be interesting to the physician, and serviceable to mankind. Our present object will be carefully to reduce this large and complicated subject into such order and compass as we can, and to bring the exposition of its facts and doctrines to the present level of medical science.

The first inquiry that naturally arises from the contemplation of this form of disease, is—under what conditions, and by what mechanism, do the hollows and interstices of the body become thus filled and oppressed with water ? In one word, what is the general pathology of dropsy ? It is an ultimate fact, that from all the surfaces of a healthy living body there is continually going on a kind of secretion, or an oozing forth of fluids. The inner surfaces of the shut cavities, and the partitions of the cells of the cellular tissue, furnish no exceptions to this law. If we examine the interior of an animal just slaughtered, or observe a cavity laid open in the human body by accidental injury, we find any of these inner surfaces *moist*, we may see the fluid escape into the colder atmosphere in the form of vapour. We perceive, also, that the surface is merely moist, the fluid in these shut cavities, during life and health, is taken back again into the circulating blood as fast as it exudes ; the two processes of exhalation and ab-sorption are accurately balanced. The disturbance of this equilibrium would account for dropsy.

Now considering the matter hypothetically, we perceive the balance may be deranged, and the dropsy arise, in one or both of the two following ways. Either the quantity of fluid exhaled may be over-abundant ; or the amount of absorption may be deficient ; or both these deviations from the natural state may occur together. It is obvious, that dropsy will ensue whenever the exha-lation takes place faster than the absorption ; and this may happen when both are in excess, or both defective. The inquiry may be reduced, however, in the first instance, to these two questions. Is there ever a preternatural amount of exhalation ? Is there ever defect of the natural absorption ? An affirmative answer to either question would *explain* the occurrence of dropsy. So, *à for-tiori*, would be an affirmative answer to both.

These inquiries being satisfied, another point would require to be investi-gated ; namely, whether the product of the exhaling process may not be liable to variation in quality as well as in amount ? Whether the liquid actually accumulated in dropsy is essentially identical with the liquid naturally exhaled ? Are there, then, any known facts which accord with the hypothesis of a pre-ternatural exhalation or pouring out of the serous liquid ? There are, and in order to appreciate them, it will be necessary to bear in mind some further physiological truths. Reference has already been made to the perpetual sepa-ration of watery fluid from all the surfaces of the body ; the external, and those which communicate with the air, as well as the inner faces of closed cavities. The fluids that exhale from the former class of surfaces are, for the most part, excretions. They are thrown out of the system, and with respect to these,

something more has been ascertained. It is observable, that when the escape of aqueous fluid from one such external surface is checked, exhalation becomes more copious from some other excreting surface, or organ. And there are special sympathies of this kind established between certain secreting parts. It is probable that, so long as other circumstances remain the same, the aggregate amount of water thus expelled from the system cannot vary much, in either direction, without detriment to the individual, manifested by symptoms. But we are sure that the quantity furnished by each secreting surface may vary and oscillate within certain limits consistent with health, provided that the defect or excess be compensated by an increase or diminution of the ordinary expenditure of watery liquid through some other channel. Sound health admits and requires this shifting and counterpoise of work between the organs destined to remove aqueous fluid from the body. The sympathy, or compensating relation here spoken of, is more conspicuous in regard to some parts than others. The reciprocal but inverse accommodation of function that subsists between the skin and the kidneys affords the strongest and the most familiar example. In the warm weather of summer, when the perspiration is abundant, the urine is proportionally concentrated and scanty. On the other hand, during winter, when the cutaneous transpiration is checked by the operation of external cold, the flow of dilute water from the kidneys is strikingly augmented. All this is well known to be compatible with the maintenance of the most perfect health. But supposing the exhalation from one of these surfaces to cease or to be diminished, without a corresponding increase of function in the related organ, or in any organ communicating with the exterior, then dropsy, in some form or degree, is very apt to arise. The aqueous liquid, thus detained in the blood-vessels, seeks, and at length finds some unnatural and inward vent, and is poured forth into the cellular tissue, or into the cavities bounded by the serous membranes.

Cases like the following are common :—a labourer is employed in some work that requires considerable bodily exertion, and he perspires profusely. But the nature of his employment exposes him also to the influence of external cold and moisture ; he is digging in a wet ditch, perhaps, in winter. He suspends his efforts for a short time—the perspiration is suddenly checked—the kidneys fail to take on the office of a safety-valve—he becomes universally anasarcous.

A child recovering from scarlet fever ventures out into a cold atmosphere while the process of desquamation is yet going on, and the surface is unusually tender and sensitive ; he is soon after attacked with dropsy of the cellular tissue, and, it may be, of other parts also. Doubtless in some of these cases inflammation takes place ; but in many of them there is merely the dropsical effusion, without any other trace or evidence of inflammatory action. The two facts which it chiefly concerns us to remark are these, 1. that the aqueous portion of the blood, which, in health, is habitually carried off, to a very considerable amount, by the skin, is suddenly diverted from that tissue, the perspiration, sensible and insensible, is suppressed ; and 2. that the cellular tissue, or the shut serous cavities, or both, become filled with serosity. It more commonly happens, indeed, that the intercepted perspiration escapes, or labours to escape, from some other free surface. Diarrhœa, for example, is more frequent, under the supposed circumstances, than dropsy ; apparently because there is a closer analogy of structure, and a more direct consent or agreement in function, and a stronger reciprocal influence between the skin and the mucous membrane of the alimentary canal, than between the skin and the serous tissues.

Dropsy of one part sometimes suddenly supervenes upon the rapid disappearance of watery collections from another part. It is no uncommon thing to see the swollen unwieldy legs and thighs of an anasarcous patient quickly unload themselves, and resume their natural bulk and symmetry. His friends con-

gratulate him, and each other, that his disease is leaving him ; but as his legs are emptying, he becomes drowsy and stupid, comatose, apoplectic ; and after his death, we find the ventricles of the brain distended with serous fluid.

A man aged about fifty was admitted into La Charité in 1819, presenting, in a well-marked manner, the local and general symptoms of organic disease of the heart. He had anasarca and ascites to a considerable extent. One morning he was found completely unconscious, with fixed eyes, a pale face, and an open mouth. His limbs, when raised, fell down again by their weight, like dead limbs. Very slight traces of sensibility of the surface remained, the muscles of the face contracting a little when the skin was strongly pinched. The evening before, this patient was in the full possession of his muscular and intellectual powers. The abdomen, which had been very prominent twenty-four hours previously, had subsided much, and fluctuation in it could no longer be perceived ; the limbs were also sensibly diminished in bulk. Death took place in a few hours.

There was not a vestige of cerebral hæmorrhage ; but the surface of the brain gave to the touch a sensation of obscure fluctuation. This became more distinct, as the upper part of the hemispheres was removed by thin slices—till at length a considerable quantity of imperfectly limpid and colourless serosity sprang out in a strong jet from the roof of one of the lateral ventricles. Both these cavities, and the third ventricle, were prodigiously distended by the accumulated water. Except that the septum lucidum was remarkably transparent, no other appreciable change existed in the brain or its appendages. A very small quantity of serosity was found in the peritoneum ; and but little flowed from incisions made in the limbs. (Andral, *Clin. Med.*, t. i. p. 134.)

Or the dropsical accumulation may be transferred from its place through a safer channel.

A gouty individual had hydrocele, and his surgeon, for some reason, did not recommend the operation for the radical cure of that complaint. After the hydrocele had lasted for some time, he became one evening intoxicated by drinking an immoderate quantity of rack punch, which greatly disordered his alimentary canal, and brought on a sort of cholera. He had profuse vomiting and purging, which quite exhausted him ; and at length he fell asleep. When he awoke in the morning he found that his hydrocele, which had been a large one, was gone : and it never returned. (MS. Notes of *Dr. Farre's Lectures*.)

In a man thirty-six years old, labouring under disease of the heart, and having anasarcous limbs, the right side of the thorax was found to be dull on percussion. One day the patient became suddenly affected with extreme anxiety, and with great though transient distress in breathing ; and he began to expectorate an extraordinary quantity of limpid serous liquid, resembling raw white of egg. So profuse was the discharge that he seemed almost to vomit the fluid. It continued for some hours, and then ceased abruptly. The next morning the respiration was easy, the patient felicitated himself on his amendment, and declared that he felt relieved from an enormous weight which had pressed upon his chest. To M. Andral's great surprise, the dullness of the right side had completely disappeared. The case is related by him as an instance of hydrothorax cured by a bronchial flux. Accidental cures of this kind are full of instruction.

If water be injected, in some quantity, into the bloodvessels of a living animal, the animal soon perishes ; dying generally by coma, or by suffocation : and when the carcass is examined the lungs are found to be charged with serous liquid, or water discovered in the cellular tissue of some other part, or in the shut serous membranes. If, however, the animal be first bled, and then a quantity of water be injected equal to the quantity of blood abstracted, the injection is followed by no serious consequences.

It has been ascertained that animals (dogs, cats, and rabbits) survive the extirpation of both kidneys for a space of time varying between ten hours and

nine days. Copious and very liquid evacuations from the intestines, vomiting, and fever, precede their death. Clear serum is found in the cavities of the brain, the bronchi are full of mucus, the intestinal canal of liquid fæces, and the blood is more than naturally aqueous. So in the disease called ischuria renalis, the secretion of urine is suppressed, death by coma ensues, and the web of the pia mater, or the cerebral ventricles, are often found full of water. In cholera there is suppression of urine for as long a space, but the brain is unaffected, for the system is drained of its water by the profuse discharges from the stomach and bowels ; conversely, in diabetes the skin is permanently dry, the kidneys pour forth their altered secretion with a fatal prodigality.

The several classes of facts which have now been briefly brought into view throw a strong light upon a confessedly obscure part of pathology. It appears that under various circumstances the blood-vessels may receive a considerable and unwonted accession of watery fluid, and that they are very prone to get rid of the redundance. When they empty themselves through some free surface, their preternatural distension is relieved by a flux ; if, on the other hand, the surface be that of a shut sac, in discharging their superfluity they cause a dropsy. Why sometimes this organ and sometimes that is selected as the channel by which the superabundant water shall be thrown out of the vessels is a matter concerning which we can seldom render any satisfactory account. We often find it difficult to determine which of the two facts in question is to be considered the antecedent, and which the consequent. For not only is it true that when the blood-vessels become overloaded with serous fluid, they readily deposit a part of it, but also that when they are in the opposite condition of comparative emptiness, when they contain less blood than is natural, they are equally ready to replenish themselves by absorbing fluids from any source to which they can find access. In the case of the individual who was cured of his hydrocele upon the occurrence of profuse watery discharges from the sto-mach and bowels, it seems clear that the expenditure of serous liquid from one part led to its absorption into the blood from another. When anasarca suddenly leaves the extremities, or ascites the abdomen, and fatal coma follows, it appears probable that the absorption is the first of the changes, and the effu-sion the second ; and had this effusion been determined to the mucous mem-brane of the intestines, to the skin, or the kidneys, it would have brought relief and safety to the patient instead of causing his death.

We have obtained, then, a glimpse of one or two most important principles in respect to the pathology of dropsy. The blood-vessels, when preternaturally full of aqueous fluid, have a strong tendency to empty themselves ; when pre-ternaturally empty, they readily drink up watery fluid wherever they come in contact with it. From the discharge of their superfluity of water arises a dropsy or a flux. The cause and the cure of many dropsies lie in these pro-positions.

The dropsies hitherto considered, resulting from the rapid as well as preter-natural pouring out of fluid by the blood-vessels, compose an especial class of dropsies, in which the arterial system is more concerned than the venous, and to which the term *active* has sometimes been applied. For the sake of con-venient distinction, and in conformity with established usage, we shall retain that epithet. But the number of these active dropsical effusions, quite independent of inflammation, is small when compared with the whole number of dropsies. The state of the part from which the effusion proceeds borders closely upon inflam-mation. The condition of its capillary circulation has been regarded as inter-mediate between that in which the ordinary quantity of secretion is maintained, and that in which inflammatory effusion takes place. The increase of secre-tion is analogous to what we observe in other parts of the body ; to the abundant perspirations, for example, that are occasioned by violent exercise ; to the in-creased flow of tears caused by any irritation of the eye, or by the passion of grief; to the augmented watery discharges from the mucous membrane of the

bowels produced by purgative drugs; all of which may be independent of in-
flammation, but all of which are attended by congestion, that may easily be
pushed into inflammation; and it is obvious that if the secretions just referred
to were poured forth into closed cavities, instead of proceeding from surfaces
that are situated on the exterior of the body, or communicate readily with the
exterior, they would constitute dropsies.

A much larger class of dropsies commence in defective absorption.   There is
no sudden and profuse gush (as in the former class) from the overladen blood-
vessels; but the fluid which is healthfully and unceasingly exhaled from the
serous surfaces fails to find its way back again into the blood, and gradually
accumulates.   The mechanism of the morbid process is commonly as follows.
Some cause retards the current of venous blood : hence the veins, and the
capillaries by which they are fed, become distended; and this distension con-
stitutes an impediment to the further admission of liquid. Absorption is sluggish,
or at a stand.   To dropsies thus originating we give the name of *passive*.   The
venous system is more concerned in them than the arterial.

But we have still to show more clearly that dropsies may and do originate in
this manner.   The agency of the blood-vessels in the production and removal
of dropsy has not been sufficiently recognised till of late; or perhaps it should
rather be said, that more importance used to be assigned to the agency of the
lymphatic absorbents than they are really entitled to.   Pathologists, even of
recent date, speak of a want of tone or energy in the absorbing vessels—of the
superfluous fluid of the part not being adequately taken up by the enfeebled
absorbents, meaning thereby the absorbent properly so called.   And this view
of the matter, connecting dropsy always with debility as its cause, has infected
the whole pathology of the disease, and led to a corresponding mode of treat-
ment, the object aimed at being the stimulation of the absorbents to more
vigorous action.   This obvious difficulty however presents itself at once to the
theory that dropsy results from deficient activity of the absorbents, viz., that
absorption goes on, and to a very great degree, in dropsical patients.   Their
adipose matter disappears, they get miserably thin.   There is no complaint in
which emaciation goes to a greater extent than in dropsy.   It is found also
that persons afflicted with anasarca become readily enough affected by mercury,
which of course must be absorbed before it can produce any of its specific
effects.

It must be confessed that our knowledge respecting absorption is not complete,
nor absolutely certain; but there appears good reason for supposing that the
process is shared between the lacteals, the lymphatics, and the veins; and
probably somewhat in this manner, that the lacteals absorb the chyle from the
surface of the intestines, and convey into the blood the materials for its reno-
vation; that the office of the lymphatics is to take up and carry into the blood
that effete portion of the solid constituents of the body which requires to be re-
moved, to make way for a fresh deposit; while the veins imbibe the serous fluid
exhaled from the surfaces of serous membranes, and into the meshes of the
cellular tissue, as well as poisonous and other substances that are soluble and
dissolved in that fluid.

Now, if this be so, one of these last sets of absorbing vessels, the lymphatic
apparatus or the venous, may continue to perform its office, while the other fails
to do so.   This theory is sufficiently consistent with the actual phenomena of
dropsical disease; and whether it be altogether true or not, a part of it is cer-
tainly true, that, namely, which assigns to the veins a large share in the whole
process of absorption.   The experiments of Magendie, Fodéré, and others, are
quite conclusive upon that point.   It has been proved that fluids may pass into
and out of the veins through their parietes, independently of any vital process,
and by mere physical imbibition and transudation; so that when the veins are
distended to a certain point with watery fluid, the introduction of more of the
same fluid through their coats is impeded or prevented; and even, when the

distension is still greater, the aqueous part of the blood may pass in the other direction out of the vessel. On the other hand, when the veins are comparatively empty, the serous fluid passes readily into them, or, in common language, is absorbed. The venous absorption is explicable, therefore, upon the principles of endosmose and exosmose, as laid down by Dutrochet; or rather, according to Professor Daniell's happy generalization of Dutrochet's facts, by the theory of heterogeneous attraction.

Imbibition being a form of that attraction, belongs in various degrees to all the tissues of the body. Its rapidity, and even its direction, in respect to the sides of a vessel surrounded by fluid, and also carrying fluid of a certain consistence, must vary with the varying distension of the vessel. When the vessel is moderately full, the exterior fluid passes uninteruptedly inwards, and is conveyed away by the internal current. When, on the other hand, the vessel is much distended by its contents, the contained fluid, or its thinner part, passes continually outwards. And there is an intermediate degree of distension, at which the pressure is just enough to prevent the transit of fluid in either direction. Magendie found, accordingly, in an ample, well conducted, and conclusive series of experiments, that by regulating the conditions of comparative emptiness or fulness of the circulating system, he could accelerate, retard, or suspend altogether the operation of a poison dissolved in the humours of the body. In other words, he could thus accelerate, retard, or prevent the proces of absorption or imbibition through the blood-vessels. If we are once satisfied of the absorbing and transmitting property of the sides of the vessels, we shall have no difficulty in perceiving how any mechanical obstacle occurring in a venous trunk may give rise to dropsy.

Has dropsy ever then, in point of fact, this kind of origin? Let us see, in the first place, as in the preceding branch of our inquiry, what answer experiment affords to this question. So long ago as in the year 1669, our countryman Dr. Richard Lower published (*Tractatus de Corde*) the following facts :—Having applied ligatures upon the jugular veins of a living dog, he observed, after some hours, that all the parts above the ligatures were wonderfully swollen. The animal died in two days; and the cellular tissue about the head and face was found to be distended, not with red blood as Lower had anticipated, but with clear and limpid serum. In another experiment he tied the vena cava just after it emerged through the diaphragm towards the heart. Death ensued a few hours afterwards, and a large quantity of water was discovered in the cavity of the peritoneum, " non aliter quam si ascite diu (canis) laborasset."

These experiments were not instituted with any reference to the pathology of dropsy, yet that Lower perceived their bearing upon that subject is plain from this sentence : " Quantum hæc ad ascitis et anasarcæ causas investigandas conducant, aliis judicandum relinquo." (*Op. cit.* p. 82.) He even explains the extravasation of the thinner or serous part of the blood as taking place by infiltration (*velut in filtro*) through the pores of the vessels. So far back, therefore, at least as the time of Lower's experiments, may be traced the germ of those doctrines respecting the dependence of dropsy upon the mechanical exudation of serum, which have been claimed as original by some recent French pathologists. The more modern experiments and observations have, however, been more carefully made, and are more conclusive. But let us again appeal to the still more satisfactory evidence afforded by the operation of disease in the human body. We find that local dropsy is continually produced in this mechanical way. To take a few very common examples of this, for the sake of illustration. The disorder called phlegmasia dolens, to which lying-in women are very liable, consists in extreme œdema of the foot, leg, and thigh, which œdema results from a blocking up of the femoral vein by coagulated blood and lymph. The essence of the disease is inflammation of that vein, and inflammation of a vein in many cases obliterates its channel. This condition is not peculiar, therefore, to parturient women ; it may take place whenever phlebitis occurs in the

same situation; it is not uncommon in unmarried females; and it sometimes happens in men. The late Lord Liverpool supplied an instance of it in his own person; and we have known more than one example of the same thing presenting itself in the latter stages of continued fever, in connexion with inflammation of the pelvic or abdominal veins. Whenever it is met with, we find the principal vein of the affected limb impervious, or nearly impervious, to the blood. The same change frequently takes place in the principal vein of the arm in women who have cancer of the breast, and then the arm becomes œdematous. In pregnancy, the gravid uterus sometimes comes to press upon the iliac veins and to impede the passage of the blood along them, and anasarca of the lower extremities is the consequence; but the anasarca vanishes so soon as the pressure is taken off by the delivery of the woman. There is a condition of the liver which the French have termed *cirrhose*, and the true nature of which will be more particularly described hereafter. Where this state of the liver exists, there exists also, in almost all cases, serous accumulation in the peritoneum—ascites. Why is this? It is because the current of the blood through the portal vein is obstructed. A French physician, M. Tonellé, relates several instances in which he noticed obliteration of the venous sinuses of the dura mater, in conjunction with water collected in the cavity of the arachnoid. There is scarcely a large vein in the body that has not been known to have its cavity closed up, or in some way sensibly obstructed, with a corresponding dropsical state of the parts from which it should have conveyed the blood towards the heart. One of the most remarkable cases of dropsy the writer ever saw resulted from the obliteration of the superior vena cava, by the adhesion of its sides which had been pressed together by a large aneurism of the aorta. The man in whose person this occurred was dropsical in his upper half only. His arms were so anasarcous that they projected from his sides; his face was grievously bloated and livid; his eyes were prominent and staring; while his lower limbs were of their natural size, and appeared preposterously small and out of proportion. He looked as if the upper part of his body had been stuffed and exaggerated for acting some character upon the stage; and his whole aspect would have been considered ludicrous had it not been at the same time so pitiable. The writer predicted while this patient was living that the superior cava would be found narrow by the aneurism. A certain portion of it was fairly sealed up.

All the instances hitherto adduced have been examples of local dropsy, dependent upon the obstruction or closure of the principal vein of the part in which the dropsy existed. And when the impediment, or cause of retardation, is felt at the confluence of all the veins of the body, that is in the right side of the heart, then we have general dropsy, anasarca of the universal cellular tissue, and an accumulation of water in all or most of the larger serous cavities.

Objections, at first sight plausible, have been made to the accuracy of the conclusions drawn from such cases as have just been mentioned.

Thus it is said that veins have been found obliterated, and yet there was no dropsy.

Now to this objection it may be replied, in the first place, that it is not every vein the obliteration of which would give rise to the collection or effusion of serous fluid. It must be the principal venous trunk of the part affected. When the secondary and smaller veins alone become, some of them, impervious, the blood may reach and return by the primary branches with sufficient readiness to relieve the turgid capillaries, and to preclude any serous accumulation.

But the principal vein itself (it will be said), has been found converted into a solid cord, and still there was no dropsy. True; but it does not follow that there never had been dropsy. It is well known that when a large artery is tied, the circulation is carried on in the corresponding part, or limb, by means of collateral arterial branches; imperfectly, indeed, at first, but at length, as the supplemental channels become gradually more free or more numerous, the

supply of blood to the limb is as copious as before. It is just the same, mutatis mutandis, with the veins, only that the anastomosing venous tubes are not so readily developed as the arterial. The writer is not aware of any instance in which it has been shown that the principal vein of a limb was impervious, and yet there neither was nor had been any œdema of the limb. The recorded cases have been met with chiefly in dissecting rooms, and the previous history of the subject has been unknown or unregistered. Mr. Kiernan examined the body of a woman who had excited much curiosity among the medical men by whom she had been seen during life, on account of a remarkable and enormous dilatation of the superficial veins of the abdomen. She was not dropsical, and the cause of the huge varix was sought for with great interest after death. The inferior cava was obliterated. Here the compensating result was obvious to the sight; the new channels had answered their purpose, and performed the functions of the original channel. Whether this woman had always been free from dropsy, Mr. Kiernan does not know.

This objection, therefore, may fairly be considered futile, until some authentic instance shall be brought forward of the obliteration of a large venous trunk, without corresponding effusion or accumulation of serum, either at the time when the observation is made, or at some previous time in the life of that individual. It is, moreover, possible that the obstruction of a large vein may be effected gradually, by the slow encroachment, for instance, of a growing tumour; and the collateral circulation may begin to be enlarged with the first impediment in the vein, and may keep pace with, and countervail that increasing impediment till the closure of the vessel is complete; so that, from first to last, there may be no notable dropsy.

Again, it is truly affirmed, that general anasarca often occurs, without any obliteration of veins, and independent of any discoverable organic disease, either in the heart, or in any other part of the body. We see this every day in weak, chloretic girls, with bloodless cheeks, and pale lips. The writer had a striking case of this kind not long since under his observation in a hospital patient. It was a good sample of a large class of such cases. The systolic action of this girl's heart was accompanied, as is not uncommon, under similar circumstances, by a loud distinct bellows-sound. She recovered perfectly, and left the hospital without dropsy, bellows-sound, or any other trace or sign of disease. There could not therefore have been any organic change. There was none; yet there had been, virtually, a retardation of the venous circulation, not by any mechanical obstacle opposed to its course, but in consequence of the debility of that hollow muscle, the office of which is to propel onwards, with a certain degree of force, the blood that reaches it.

Girls of this description have weak and flabby voluntary muscles; and it is reasonable to presume that the involuntary muscle, the heart, partakes of the general feebleness of the muscular system, and becomes incapable of sending the blood forwards with the requisite energy. Nay, it is credible and likely, that a feeble heart may in these circumstances yield a little and dilate under the resisting pressure of the blood which enters its chambers; and that, in this way, the occasional but temporary bellows-sound may arise, in consequence of the altered relation between the cavities of the heart and their outlets. And the *juvantia* and *lædentia* confirm this view of the matter. If, tempted by the pain complained of by the patient, or by the violence with which her overtasked heart is throbbing, we take away blood, we find that, whatever present relief she may experience, she is ultimately weakened by the depletion. On the other hand, if we give her steel, feed her well, and administer the cold shower bath, we find that she regains her lost strength, that colour returns to her lips and cheeks, that her palpitations cease, and her dropsy departs. In proportion as the muscular system in general receives fresh tone and vigour, does that particular muscle, the heart, recover the degree of power necessary for the effectual discharge of its proper function, which is very much that of a forcing pump. Such is the way in which we would explain both the dropsy and its cessation. In such

cases our patients do not simply recover, they are cured; and we would apply the same explanation to some other forms of dropsy. Andral describes a certain cachectic condition of the body as being a cause of dropsy; persons may be bled into a dropsy, and starved or weakened into a dropsy. These are genuine instances of dropsy from debility, such as the ancients conceived all dropsies to proceed from. It may be that the thin or watery condition of the blood, induced by frequent bleedings, by insufficient nourishment, by poisons, or by other causes, may facilitate its escape through the sides of the vessels; but it seems more probable, that all dropsies arising under the circumstances just referred to, and without any apparent organic disease or change, are mainly, if not entirely, to be ascribed to debility of the heart; and viewed in this way, they are all brought under the same general principle; namely, the retardation of the blood in the veins, and the consequent preternatural fulness of the blood-vessels. All passive dropsies, at least in our opinion, may ultimately be referred to this principle. This principle being once admitted, several other phenomena, which could scarcely be adduced in proof of its soundness, may find in it their explanation, and thus serve to confirm its truth. Persons of a full habit are observed to perspire readily and profusely; and it is asserted that if such persons are bled, the tendency to perspiration either yields entirely, or is sensibly diminished. (Darwall, *Cyc. Pract. Med.* i. 635.)

Again, it is a common belief that dropsies are more frequent in places where the atmosphere is habitually charged with moisture. Granting this to be a fact, we perceive a reason for it in the discouragement given by such a condition of the air to the cutaneous transpiration. Hence, upon any defect arising in the compensating functions of the kidneys, or other excretories of water, may ensue a dropsy. We must be careful not to fall into the mistake which some have committed in this matter, of supposing that water is absorbed from the humid atmosphere into the body, through the integuments.

By the same principle, dropsies that follow the suppression or cessation of customary discharges are capable of explanation. Palsied limbs are known, in some cases, to become rapidly œdematous. Here the venous current is retarded for want of the usual pressure afforded by the play and stress of the surrounding muscles.

What has hitherto been said of the dependence of passive dropsy upon some obstruction, virtual or mechanical, to the passage of the blood along the veins, either at the heart, or in venous trunks where no collateral venous channels have been established, has reference to veins of a certain magnitude. The obstruction must necessarily extend to, and be felt in, the capillaries from which those veins are supplied. But it is more than probable that the same things are true also of the capillaries themselves, independently of the larger veins. It has been ascertained by microscopic observations, that in commencing inflammation, the blood soon stagnates in the capillaries, and serous effusion, marked by more or less tumefaction, is one of the earliest results of that impediment to the circulation. So that all preternatural accumulations of serum in the cellular tissue or in the serous membranes, may with great likelihood be included in the same category of unnatural fulness of the vessels—a state which is very commonly the result of retarded circulation. To bring similar morbid phenomena under one general law is at all times convenient and satisfactory; and the general law here indicated is accordant with all the facts embraced in its expression, while it seems open to no serious or insurmountable objection. Until, therefore, a better is proposed, we may place confidence in this, and regard it as a true and sound principle.

There is a very important species of dropsy, with which certain morbid conditions of the kidney are associated, and in the production of which those morbid conditions play sometimes a conspicuous part. In active dropsies, originating in exposure to cold, the kidney frequently sustains serious injury; and thus the foundation is often laid for changes in that gland which are met with in more chronic cases. The same changes occur also where no such violent antecedent disturbance can be traced. The pathology of these slower cases is somewhat

obscure ; in a large majority of them, however (in all, probably, at the outset of the dropsy), the urine is scanty, and the anasarca increases or decreases as the quantity of urine diminishes or augments. In a few instances in which the urine appears to be sufficient, some other emunctory, and especially the skin, is commonly defaulting. Alterations arise also in the qualities and composition of the urine itself; it is of a remarkably low specific gravity, contains albumen, and is deficient in the amount of its customary salts. This species of dropsy will require a special consideration hereafter ; it does not often occur uncomplicated with other organic disease, of which the effect in producing dropsy is more evident ; but even in its pure forms it may be shown to come within the operation of the principle already laid down, or at least to offer no objection to it.

In the preceding discussion, extreme cases have been taken to elucidate the two classes of dropsy that have been respectively denominated active and passive. It may help towards a clearer notion of the pathology of which we are in search, if we contemplate the points of resemblance and the points of distinction between the two forms. They resemble each other in the result ; namely, in the collection of serous liquid in the circumscribed cavities and vacuities of the body. They differ in the rate at which the collection augments.

In the well-marked acute cases the liquid is rapidly effused, in quantity much exceeding the natural amount of exhalation. In the well-marked chronic cases the exhalation goes on as usual, but the fluid exhaled is not taken back again into the circulating vessels with sufficient facility. In the one case, the circulation is disturbed and tumultuous ; in the other, it remains tranquil. It is probable that in the more acute forms, the serum passes through the coats of the arteries, or of the capillary vessels next adjacent to the arteries. In the completely chronic form, there is a defect of absorption by the veins.

But there are intermediate degrees, in which it appears that the full veins not only are unable to admit a new supply of aqueous liquid, but also to retain that which they already hold, and serosity exudes from them also.

What connects all these forms of dropsy is a preternatural fulness in some part, or the whole, of the hydraulic machine. And this seems to be the great key to the entire pathology, as well as to the remedial treatment of the disease.

The chemical composition of the liquids accumulated in the various forms of dropsy is very similar to that of the serum of the blood. This is what we should expect, supposing our theory of the mode in which these maladies take place to be true. The ingredients are nearly the same in kind, but they co-exist in different proportions. Dropsical fluids contain more water, and less animal matter. The ratio of the saline ingredients is subject to much less variation. The liquid of chronic hydrocephalus is more purely aqueous than any other; it does not coagulate when heated : it holds an extremely small quantity of animal matter ; but it is impregnated with nearly the same amount of saline matter as is present in serum. The following tabular result of Dr. Marcet's experimental inquiries on this subject affords a general view, sufficiently accurate, of the relations subsisting between the fluids of dropsy and the serum of the blood :*—

| | In 1000 parts of fluid. | | |
	Water.	Animal matter.	Saline matter.
Fluid of chronic hydrocephalus -	990·80	1·12	8·08
" spina bifida - - -	988·60	2·2	9·2
" hydrothorax - - -	973·2	19·	7·8
" hydropericardium - -	967·	25.5	7·5
" ascites - - - -	966·5	25·	8·5
" hydrocele - - -	920·	71·5	8·5
Serum - - . - -	900·	90·8	9·2

* Med. and Chirurg. Trans. vol. ii. p. 381.

To this preliminary sketch of the conditions under which dropsy is apt to arise, it may be convenient to add a few remarks upon some of the phenomena belonging to the effusion or collection itself.

It is a familiar fact that the water of dropsy frequently changes its place, in obedience to the force of gravity. In general anasarca, when the serous accumulation slowly augments, it first becomes visible about the feet and ankles. There are two causes for this; the one occasional, the other general, in its operation. The veins of the feet and ankle are liable, when the patient is erect, to be more distended than other veins; for unless the action of their valves be quite perfect, these vessels sustain the weight of the superincumbent column of blood, which concurs with other causes to retard the upward current, and to gorge the depending capillaries. Under such circumstances the effusion or the arrest of absorption may first take place around the insteps. But in general it is not so. In most cases, the truer and simpler reason of the early manifestation of dropsical swelling about the ankles is merely that the serous liquid which fails to be removed from the cellular tissue in all parts of the body gravitates towards the lowest part; and being thus collected into a comparatively small space, is rendered more perceptible. During the night, when the horizontal posture is maintained for several hours, the œdema of the ankles disappears, but the neck and face, perhaps, become puffy and bloated. And it is obvious why, in these cases, the feet towards evening swell more than the hands: the hands receive the serous fluid from the cellular tissue of the arms alone; the feet that which sinks down, not only from the legs and thighs, but from the head and trunk also. The limbs may be considered as bags, which fill up in proportion to the quantity of liquid detained; and the lungs are similar bags; and in these cases we commonly may hear the crepitation of pulmonary œdema in their lowermost portions.

An instance has been already referred to, where one-half only of the body was anasarcous, and that the upper half. The descent of the dropsical fluid was prevented by the dress of the patient; the waistband of his trowsers having compressed the cellular tissue through which alone the gravitating liquid could seek a passage. So, sometimes, it is stopped at a lower point of its descent by tight garters, and the thighs swell earlier than the insteps. It is not at all uncommon to see persons who, in the daytime at least, and in the erect posture, are anasarcous in the lower half only of the body. We do not so often meet with cases of anasarca of one moiety of the body, the division being made by an imaginary plane drawn through its axis. But this does occasionally happen. For the most part this curious phenomenon is merely the result of accident, the patient who labours under anasarca being at the same time unable, from the circumstances of his disease, to leave his bed, or to lie at all except on one side, and then the accumulating liquid gravitates to that side. The writer has, however, seen one case to which this explanation was not applicable. He believes, that some local obstruction to a large vein in the neighbourhood of the shoulder caused œdema there, and the fluid sank down and filled the cellular tissue of that side alone. It was not in his power to verify the truth of this conjecture, for the patient recovered.

Cæteris paribus, those parts of the body become the most loaded with serous fluid, and show the anasarca the plainest, of which the cellular tissue is plentiful and loose, as the eyelids and the scrotum. But in extreme cases the liquid pervades the cellular tissue where it is much more dense and compact; as where, for example, it is subjacent to mucous membranes. In the examination of a dropsical corpse, the mucous coat of the intestines may sometimes be seen to be elevated by the water collected beneath it; it then looks like jelly, and the valvulæ conniventes, which are flat and thin in their ordinary state, become round and convex. Dropsy of the submucous tissue of the air passages is frequently a cause of death.

Many persons seem disposed to ascribe these anasarcous swellings, espe-

cially when they make their appearance suddenly, to inflammation : and great stress is laid, and much argument expended, upon the frequency of *inflammatory dropsy*. But the facts that have just been passed in review sufficiently refute this theory. If the serous liquid be the product of inflammation, what is the part inflamed ? It cannot be, as some of these writers appear to think, the distended cellular tissue itself; for if so, the inflammation must shift its quarters under the influence of gravity. The term inflammatory dropsy may not, perhaps, be indefensible when applied to that smaller class of dropsical affections which have been spoken of under the head of active dropsy. We are far from denying the frequent agency of inflammation in producing changes which in their turn lead to dropsy : but it will be well not to confound those collections of serum, mixed with blood or coagulable lymph, which are distinctly events or products of inflammation, with other collections of serum which resemble the former in that respect only, but differ entirely from them in every other particular. To the class denominated active, which occur suddenly, from defect of some one or more of the usual channels of aqueous excretion, and which are attended, usually, with considerable disturbance of the whole system, the epithet *febrile* would not be inappropriate. There may be some few cases in which it is impossible to determine whether the effusion be inflammatory in its origin or not ; if the serum be turbid, if we discover in it the smallest admixture of pus, or of flakes of lymph, or if the disease has been marked by the ordinary signs of internal inflammation, we need not hesitate in our opinion. One of the later systematic writers on dropsy in this country holds that all dropsies are more or less inflammatory. We can see one reason for this mistake (for a mistake it surely is) in the relief and amendment which often ensue upon the employment of bloodletting in dropsy.

The general *prognosis* of dropsy will be readily gathered from what has been said of its causes and conditions. That which arises in chlorotic young women is the least perilous and the most curable.

Of the rest, febrile dropsies are more obedient to treatment, and oftener admit of complete recovery, than the passive and chronic.

Local dropsies are to be regarded with hope, in proportion as the obstruction upon which they depend is capable of being removed, or compensated by the developement of fresh channels for the delayed blood. As far as the mere water is concerned in the chronic forms of the disease, cardiac dropsies are more readily dispersed for a time, but more likely also to return, than dropsies that are complicated with renal disease. It is obvious also that the immediate danger of dropsical accumulations will depend much upon the place the liquid may occupy. The difference in this respect is immense between the tunica vaginalis and the pericardium, between the cellular tissue of a limb and that which lies beneath the mucous membrane of the glottis.

We are next to consider the principles by which our practice in the *treatment* of dropsies is to be regulated. As, in most cases of dropsy, there are two distinct sets of symptoms observable, those, namely, which result from the presence of the accumulated water, and those which depend on the bodily conditions that have produced the accumulation, so there will arise, in most cases of dropsy, two main indications of treatment—the removal of the dropsy itself, and the suspension of its physical cause. The latter object implies either the complete remedy of the morbid conditions productive of the dropsy, or the establishment of some new condition which shall prevent or countervail their operation.

These two main indications may be fulfilled, in different cases, with very different degrees of facility. If the morbid conditions productive of the dropsy be cured, or their tendencies averted, the accumulated liquid will in most cases soon disappear of itself. But even under these favourable circumstances, its departure may often be accelerated by art. On the other hand, the removal of the accumulated water may often be accomplished, while the more impor-

tant indication, which strikes at the root of the disorder, and would prevent its return, is capable of being effected slowly only, and with difficulty, imperfectly, or not at all.

The evacuation of the dropsical fluid is first to be attempted through the medium of the blood-vessels. Whatever empties the turgid veins enables and disposes them to refill themselves by drinking up the superfluous liquids of the body, to be afterwards discharged by some of the natural channels of excretion.

The blood-vessels are directly emptied by venesection; and accordingly we find in bloodletting one of our most powerful means of dispersing the water of dropsies. In that class of dropsies which we call active or febrile, the withdrawal of blood by the lancet is beneficial in more ways than one. It helps to relieve that congestion upon which the effusion depends, and which is often the parent of inflammation : it tends to abate the undue action of the heart : and it facilitates, in the manner already pointed out, the reabsorption of the effused liquid into the veins, and its ultimate elimination from the system.

But although bloodletting is the most direct and certain way of unburdening the loaded veins, and therefore, in many instances, the most effectual remedy for the dropsy, it is by no means adapted to all, nor even to many forms of the malady. It will always, indeed, remove a portion of the aqueous ingredient of the blood, but it expends at the same time its fibrin, and its red particles; it impoverishes the circulating fluid, and so enfeebles the patient more than the indirect measures for evacuating the collected liquid, to be considered presently. Perhaps, by rendering the blood more watery, venesection may indirectly favour the transudation of its serum outwards, whenever the venous current happens to be retarded, but it certainly weakens the central organ of circulation; and to muscular debility of the heart we have already seen that certain forms of general dropsy may owe their origin—and thus it is that ill-timed or excessive bleeding may be the cause of dropsy. In these forms of anasarca, instead of robbing the veins of their blood, we seek to repair the quality and richness of that fluid, and so to restore the deficient vigour and tone of the whole muscular system, and of the heart in particular.

In many cases then it is inexpedient to let blood; and we endeavour to empty the vessels indirectly, and in such a manner as to withdraw from them the more watery parts only of their contents. In other words, it becomes our object to augment the discharge of watery fluid from some one or more of the secreting surfaces of the body; but it must not be the inner surface of a shut sac.

We have already pointed out the close analogy that subsists between dropsies and fluxes. Dropsy is a flux into a closed cavity. Fluxes would be dropsies if the fluid poured forth did not escape; and it is to be remarked that we frequently endeavour to cure a dropsy by establishing a flux.

By what surface or channel this artificial drain shall be attempted is often a matter of the greatest nicety and importance. In some cases we try to promote the discharge of the superabundant water by the way of the kidneys; in others, by the mucous lining of the alimentary canal; in others, by the external skin; scarcely by the pulmonary membranes. The circumstance by which our choice must be determined will come under review hereafter.

In whatever way (not merely mechanical) we propose to evacuate the superfluous moisture, we diminish, directly or indirectly, the quantity of fluid circulating through the blood-vessels. There is no short road between the sac of the peritoneum, or the cellular tissue of the legs and thighs, and the kidneys or the bowels; and the very efficacy of diuretic medicines, and hydragogue purgatives, in unloading the burdened cavities, affords confirmation of the correctness of the views already advanced concerning the dependence of dropsies upon too full a condition of the vessels, sometimes impending the due absorption, sometimes giving rise to excessive or irregular exhalation; and these views bring us nearer, it is

conceived, to the true nature of these disorders, than the exclusive theories either of debility or of inflammation.

By these means, then, specially directed to particular cases, we seek to avoid or to remove the inconveniences and the dangers that result from the imprisonment of the superabundant liquid.

In the febrile form of dropsy we strive to correct whatever functions may be found in error.

In the chronic dropsy, from organic impediment to the venous current, we are desirous of devising measures, 1, for removing the impediment, by unloading, for example, a gorged and tumid liver : 2, for allowing the gradual developement of a collateral or supplementary venous circulation ; and 3, if we fail of these objects, or find them not obtainable, we then keep the disease at bay, and prevent, if possible, its increase.

Passive, chronic dropsies are much more difficult of cure than the active and febrile, and will often baffle the best directed attempts for their relief. We are not to regard those passive dropsies that depend upon the permanent obliteration of a large vein as necessarily incurable, because if a collateral venous circulation be accomplished, the dropsy will cease, to return no more. But we must give nature the credit of the cure in such cases. Time is the best remedy ; and all that we can sometimes do is to alleviate in the meanwhile the most distressing or threatening of the symptoms.

When, in spite of the measures adopted, the dropsical accumulation persists, or increases, and when, as often happens, the imprisoned liquid constitutes, by its pressure, nearly all the suffering of the patient, as well as much of the danger, we may frequently afford much present comfort, and prolong life, by drawing off the fluid, mechanically, through openings made into the part containing it. Paracentesis is the scientific, and tapping the vulgar name for this proceeding. It has been performed successfully by means of a small trocar, to evacuate the water from the brain in chronic hydrocephalus ; it is often resorted to for the purpose of emptying the peritoneal cavity, and the tunica vaginalis testis ; and it is not unfrequently practised to let out the fluid of anasarca ; for acupuncture of the legs and thighs and scrotum is only one form of tapping.

Less frequently, paracentesis of the chest is performed in cases of simple hydrothorax. It has been proposed, but never sanctioned in this country, for the removal of the effused fluid in hydropericardium.

In the local variety of dropsy that is called Hydrocele the re-accumulation of the liquid is often prevented by exciting just so much inflammation of the membrane, as may cause its opposite surfaces to cohere, whereby the cavity itself being abolished, any return of the disease is rendered impossible.

This is an expedient which we do not dare to employ in other species of dropsy ; in ascites, for example : 1, because the inflammation itself would place the patient's existence in imminent peril ; and 2, because if it could be safely conducted the adhesion and obliteration would seriously embarrass and impede the functions of other organs.

The circumstances which require and justify this mechanical remedy, and the rules and precautions to be observed in its performance, will be considered when we come to treat of particular forms of dropsy.

CARDIAC DROPSY.

The mode in which disease of the heart may occasion general dropsy has already been sufficiently explained. In such cases, indications more or less distinct and certain, of the cardiac affection, are generally observable. We judge that the dropsy has this origin ; 1, by the presence of thoracic symptoms, such as cough and dyspnœa occurring prior to the dropsy : 2, by the direct signs of cardiac disease, such are distended jugular veins, irregular movements of the

heart, unnatural impulse, altered sounds : 3, by the history of some previous
acute disease, affecting especially the left side of the thorax ; or, particularly,
by an account of antecedent arthritic rheumatism : 4, by the advanced age of
the patient, rendering it probable that some of those organic changes in the
heart and large blood-vessels are in progress, which are almost natural in the
decline of life : 5, by the absence of all evidence of renal disease.   But we see
many persons who labour unequivocally under organic disease of the heart, yet
who survive even for years without becoming dropsical.   The interesting
question, therefore, at once arises, of what kind of heart disease is dropsy a
consequence and symptom ?   The answer is, of such disease of the heart as
produces a certain amount of permanent obstruction to the passage of the venous
blood.   The permanent obstacle must be sufficient in degree to distend the
veins beyond their natural capacity.   Hence dropsy is especially associated
with dilatation of the right chambers of the heart.   It would be incorrect to say
that the dropsy is dependent on such dilatation, for the dilatation itself is at once
an effect and a sign of impeded transmission of the blood from the right side of
the organ.   Nor is such dilatation a necessary attendant on the general accu-
mulation of water.   The impediment may be sufficient to gorge the right cavi-
ties, while it is yet too slight in amount or too recent in duration, to have dilated
them.

What then are the conditions which imply an impediment of the kind we are
now considering ?   The two great vital organs contained within the thorax, the
heart, namely, and the lungs, form different parts of one common mechanism,
the object of which is to supply every part of the body with blood that has
been recently exposed to the air ; and these organs, thus closely related in
respect to function, are, moreover, so reciprocally dependent, that any struc-
tural change occurring in the one tends to produce disease, sooner or later, in
the other also.

And it is well worthy of observation, that the order in which the diseases of
these organs are connected, as cause and effect, is a definite and constant
order ; taking place in the direction opposite to that in which the blood circu-
lates.   Disease existing in any part of the circuit formed by the right cham-
bers of the heart, the lungs, and the left chambers, becomes a cause of
consecutive disease, first in the part immediately behind it.   The heart itself,
as is well known, is seldom diseased throughout, or diseased in a like manner
and degree throughout ; and its partial affections, which are exceedingly com-
mon, obey the law just announced as being applicable to the whole circuit of
the lesser circulation.

Thus organic disease situated at the aortic outlet of the heart, and of such a
kind as to hinder the exit of the blood from the left ventricle, gives rise to
permanent changes in that ventricle—to hypertrophy, with, or less commonly
without dilatation.   The hypertrophy is here a truly compensating and conser-
vative change ; and when it is exactly proportioned to, and keeps pace with, the
impediment which has given it birth, so as precisely to countervail and balance
that impediment, no delay takes place in the stream of arterial blood, and the
injury is, as yet, confined to the left ventricle.   That chamber is remodelled
and adapted to its purpose by the *vis medicatrix naturæ ;* aad no other
evil manifests itself than, perhaps, some slight encroachment and pressure
upon the neighbouring parts in consequence of the augmented volume of the
heart.

So long as the mitral valve remains healthy and effective, it offers a barrier
of protection against the extension of the disease in the direction which is retro-
grade in relation to the course of the blood.   But at length, in most instances,
the stress becomes sensible further back.   The left auricle and the pulmonary
veins become embarrassed, distended, dilated ; the blood is detained in the lungs.
Then dyspnœa commences.   At first it is occasional only, whenever the heart
is tasked with the conveyance of a greater quantity of blood in a given time

than usual—as in brisk movements of the body, or strong emotions of the mind; or when it is oppressed by circumstances that diminish the capacity of the chest, by a full meal, therefore, by flatulent distension of the stomach and intestines, by the recumbent posture. Afterwards the dyspnœa becomes more or less constant and distressing.

And this gorged and embarrassed condition of the lungs, even when it is permanent, and has reached a considerable degree, may exist without materially interfering with the functions of the right cavities of the heart; for the pulmonary plethora may be relieved by increased secretion from the bronchial mucous membrane. Dyspnœa, even when it has thus become habitual, may precede for some time any appearance of dropsy.

At last, however, the effects of the original evil augmenting and extending, the right ventricle also becomes unable duly to propel its contents into the pulmonary vessels; it continues morbidly full, is first distended occasionally, then permanently, and at length dilated; and with the dilatation we have a turgid venous system, of which we see a part in the prominent veins of the neck.

In this manner, then, may the series of symptoms be explained, so commonly noticed as life advances. We find irregularity of the pulse, preternatural impulse of the heart, occasional dyspnœa, large crepitation, habitually audible in the lower portions of the lungs, more or less expectoration, sometimes tinged, sometimes even loaded with blood; eventually the ankles begin to swell, and the patient becomes by degrees (unless he is cut off in some other way) decidedly and universally dropsical.

Many of the direct signs of diseased heart may exist, therefore, while there is no dropsy: intermissions and irregularity in its movements, palpitation, the impulse proper to hypertrophy. But when dropsy has supervened, we may expect also the signs which denote the dilatation of the right chambers: the heart is heard and felt to beat beyond the præcordial limits, the pulsations become feeble and unequal, if they were not so before; the patient is liable to fluttering palpitations, to extreme and panting dyspnœa on the slightest exertion, even on taking food into the stomach, or adopting the horizontal posture; his skin assumes a dusky hue, and his lips and extremities are apt to be livid.

In these cases the anasarca first becomes manifest about the ankles. During the earlier stages the œdema disappears in the night, and returns towards evening. It is sometimes confined, for a considerable period, to the legs; but by degrees it ascends towards the trunk of the body, the integuments of which become doughy, the scrotum fills, and water collects in the serous bags of the abdomen and thorax. In extreme cases the dropsy is universal, pervading the cellular tissue of the head and face and upper extremities.

As the accumulation of serous fluid is commonly gradual, the reticular tissue, partly perhaps through maceration, but chiefly from continued pressure and stretching, loses its elasticity: and the œdema is soft, and pits readily.

Sometimes, the fluid continuing to increase, the cuticle is separated by it, and large vesications take place on the limbs, or some part of the cellular tissue sloughs, and a breach of the surface is made; and the fluid drains off by this vent in great abundance, to the signal relief of the patient. This beneficial accident furnishes a valuable hint to the practical physician.

The ordinary cause of those changes in the heart which lead at length to dropsy have already been casually glanced at.

The most common of them all is advancing life. The morbid change appears to commence in the aorta, and consists in a deposit of cartilaginous or calcareous matter beneath its innermost membrane. By this alteration the elasticity of the artery is impaired; it acquires a facility of dilatation, and the onward passage of the blood, after it issues from the left ventricle, is virtually delayed: hence increased efforts on the part of that hollow muscle to propel its contents, and the gradual backward propagation of organic change.

It would perhaps be more correct to attribute those alterations of structure to

that decay, which occurs in virtue of a law that extends to all organised bodies, rather than to disease. Earthy concretions in the coats of the arteries are met with (according to Bichat's experience) in seven persons out of every ten, who die beyond the age of sixty; and Dr. Baillie declares ossification to be much more common in old persons than a healthy state of the arteries.

But the cardiac mischief often originates at an earlier period of life, in acute or chronic inflammation of the membranes that invest and line the heart. Chronic endocarditis, marked at its outset by slight or vague symptoms, appears to be of common occurrence, for its effects are very frequently seen in the dead body. Among the causes of this chronic disease, habitual intemperance, especially an excessive or long-continued indulgence in ardent spirits, holds, we believe, the first rank. But acute inflammation of the pericardium, or of the endocardium, or of both simultaneously, is also a frequent source of subsequent changes in the proportions of the several chambers of the heart. Such inflammation may arise from ordinary causes, and exist and run its course independent of any other diseased condition. In by far the majority of instances, however, it takes place in connexion with acute articular rheumatism. The frequency of this complication, in those persons at least who suffer rheumatism in London is very remarkable. The heart is found to be more or less involved in the disease, in not less than one-third of all the patients admitted with acute rheumatism into our hospitals. Of *rheumatic carditis* it has been noticed, 1. That its proper symptoms are often unheeded by the patient amid the severer pains that affect his limbs, and may easily be overlooked by the practitioner who does not vigilantly search for them: 2. That when the cardiac symptoms are well marked, or being but slightly marked have been looked for and detected, they generally cease in a great measure, or entirely with the cessation of the joint disease they accompany, or that those signs which remain (as unnatural sounds) are not of a kind to induce evident distress, or to claim the attention of the patient: 3. That nevertheless the organ seldom (according to the writer's belief, never) reverts to its former state, or undergoes complete repair; but the structural changes left by the inflammation form the germ of further changes, progessive in their character, and ultimately destructive of life.

Rheumatic endocarditis is more common than rheumatic pericarditis. Each tends gradually to produce such conditions of the heart as occasion dropsy; and it may be worth while, in our endeavour to analyse and trace home these conditions, that we should consider for a moment the manner in which the consecutive changes are brought about.

When in the course of rheumatic fever, inflammation befalls the lining membrane of the heart, it affects chiefly the valves; and especially (but not exclusively) the valves of the left side of the heart; and most constantly of all the sigmoid valves of the aorta.

It will at once be seen how these valves, by their being thickened, or shrivelled, or puckered, or rendered stiff by their adhesion to neighbouring parts, by their ulceration or perforation, may have their peculiar functions permanently injured; so that they are apt to become, on the one hand, an obstacle to the free passage onwards of the blood, or incapable, on the other, of effectually preventing its backward passage. Hence an imperfect emptying of the chamber that precedes the seat of the special alteration; hence continued striving, and hypertrophy, and ultimately, according to the degree and place of these changes, an extension of disease towards the right side of the heart.

Again, when acute pericarditis is set up, the inflamed membrane either adheres—partially it may be, but more often at all points—to the heart, or it does not adhere. If it does not, the patient dies in the primary attack. If it does, all signs of cardiac disease may disappear. But the seed of future mischief has been sown; *hæret lateri lethalis arundo ;* the free movements of the heart are fettered by the adhering bag; the muscle is urged to stronger or more frequent contractions; and this is aided by the effects of the endocarditis,

which probably never fails to accompany in some degree the inflammation of the outer membrane. Hence, again, the extension of disease in the direction contrary to that of the blood.

When these facts are taken into account, they will serve to explain how it is, that when we come to examine a patient labouring under manifest disease of the heart, we so very often trace, in his history, one or more attacks of acute rheumatism. They who have not been in the habit of putting the question as to this point, would be surprised at the number of such cases. When the articular rheumatism was present, the heart affection was perhaps unnoticed, or, if noticed, the patient, as he and his medical attendant are apt to think, got quite well; and when, at length, unequivocal symptoms of organic disease of the heart force themselves upon our attention, its rheumatic origin is too often unsuspected or forgotten.

Obstruction to the venous current and dilatation of the right chambers of the heart may be propagated, in the manner now described, from the left side of that organ. But the obstacle may begin at an earlier link of the chain, as in the lungs; and an incidental question of much interest also presents itself, namely, in what kinds of pulmonary disease is cardiac dropsy liable to originate?

Whatever tends to gorge the right cavities of the heart with blood, tends also to the production of general dropsy. On this principle it might be expected that dropsy would form a symptom or direct consequence of some of the acute disorders of the organs of respiration. When, in pneumonia, a large portion of one or of both lungs becomes impervious by air and blood, or when pleurisy fills one side of the thorax with liquid, which shuts out by its pressure air and blood at once from one-half the respiratory apparatus, the egress of the blood from the right ventricle, and therefore from the venous system, must be impeded. And, in truth, dropsical effusion is occasionally the result of such disease. That it does not occur more frequently is to be attributed to the free evacuations, and the abstinence, which are early put in force in these complaints, and which relieve the distension before it produces effusion. In one remarkable instance of acute laryngitis which fell under our care, the whole body was anasarcous at the time of the patient's admission into the hospital. His life was saved by tracheotomy, but the dropsical effusion had previously disappeared in a few hours after one copious bleeding from the arm. This case illustrates the tendency to dropsy arising under impeded transmission of blood through the lungs; it both exhibits a conformity to the general principle, and affords a probable explanation of its infrequent operation.

Again, lungs that are hollowed out into large cavities, or rendered solid over a wide space by numerous tubercles, are manifestly incapable of admitting into their vessels from the right heart, the ordinary quantity of venous blood. In these cases, however, the whole mass of blood is diminished, and kept within the limit, which does not imply distension of the veins, by the constant agency of various causes; by the imperfect nutrition of such patients in consequence of abdominal disease; by the sometimes copious expectoration; by the wasting diarrhœa; by the profuse perspirations. Accordingly, dropsy is an unusual symptom in pulmonary phthisis, or shows itself in the latter periods only of the disease, in the form of œdema of the legs; and its occurrence then is mainly owing to the debility which affects, in common with the other muscular parts of the body, the moving organ of the blood.

The disease of the lung which most commonly and certainly, though often very slowly, leads to dropsy, is dilatation with or without rupture of its air-cells; in modern nomenclature, *emphysema of the lungs*. In this morbid condition many of the smaller blood-vessels of the organ become gradually obliterated, in consequence of the pressure arising from the stretching of the membranes, upon or between which they ramify. When the dilatation is extensive and advanced, the pulmonary texture is visibly white and bloodless. Meanwhile the nutrition

of the body is not impaired; the same quantity of blood continues to be returned towards the heart, but it finds not a ready entrance, when sent from that organ, into the pulmonary blood-vessels; a certain amount of accumulation becomes habitual in the right side of the heart and great veins, and at length the capillary vessels feel the congestion, and more or less anasarca takes place.

It is seldom that secondary disease and disorganization are produced in the opposite direction; in the lungs, for example, by disease of the right heart, or in the left heart, by disease of the lungs. When progressive disease takes this course, it constitutes an exception to the general rule.

Disease of the bicuspid orifice may lead sometimes to changes in the ventricle beyond it. A scanty supply of blood will cause, we believe, irregular contractions of the left ventricle, and finally hypertrophy of its walls. Usually, when the mitral valve is much diseased, the left ventricle is found to be dilated and thickened; but in the majority of such cases the aorta orifice, or the commencement of the artery, is involved in the disease.

It is laid down indeed by several of the continental writers, and by some of our own, that certain diseased conditions of the pulmonary texture—what is called pulmonary apoplexy, for instance—are consequences of pre-existing disease of the right ventricle of the heart. It would occupy too much space to specify here the reasons which induce the writer to distrust this doctrine. They are briefly stated in a paper printed in the *Medical Gazette*, vol. xvi.

The same effects upon the venous circulation may arise when there is no primary organic disease of the heart, from mere debility of its muscular tissue; such as occurs in anæmia often; in what is vaguely called cachexia; in exhaustion from habitual loss of blood; in any case, in short, in which the muscular tone is considerably reduced. The muscle is ill-nourished by the thin and watery blood; it cannot tighten upon its contents with sufficient force to drive them effectually forwards; it may even dilate somewhat under the centrifugal pressure of the resisting liquid; the attenuation of the blood concurs to facilitate transudation of its serosity through the coats of the minute vessels, and dropsy ensues.

The anasarca thus arising from the debility of the heart and poverty of blood in young, feeble, or delicate women, is so common, as to require a more particular description of its features and circumstances. It seldom goes beyond œdema of the legs, but occasionally the trunk and arms are slightly infiltrated, and the face is buffy and bloated. It is rarely that the large serous cavities are affected.

These patients are pale; their lips, gums, and tongue, are without colour, or but faintly red; their muscles flabby and weak. They are " nervous," easily agitated, of variable spirits, and often hysterical; subject to palpitation of the heart and shortness of breath whenever they ascend a hill, or a flight of stairs, or make any exertion. In very many of them, the systole of the heart is attended with a bellows-sound; and a roaring noise, continuous or intermittent, like the murmur heard in certain shells when applied to the ear, may be heard in the vessels of their neck. Their extremities are readily chilled, their feet are cold at night, and they suffer in the winter from chilblains. They complain of pain in one or the other hypochondrium, most often in the left; and of headache, which occupies now one and now the other temple, or is more generally diffused.

In most instances they are subject to amenorrhœa, or irregular menstruation. Commonly, the discharge is scanty, pale, postponed, and attended with pain, and leucorrhœa is present in their intervals. Sometimes they have tenderness along the course of the veins of the lower extremities, particularly of the saphena and femoral veins. This symptom is frequently observable when the irregularity dates from some sudden check to the actual process of menstruation. Usually the appetite of these patients is slender and fastidious, and they do not like meat.

This form of cardiac dropsy is almost always curable. Most of the symptoms are referable to a deficiency of red blood, and gradually disappear as the improving complexion indicates that the quality of the blood is restored.

It is necessary to remark, that tumours of various kinds (aneurisms of the aorta, cancerous growths, &c.) occupying the thorax, and causing pressure upon the large veins in their neighbourhood, may be the cause of general dropsy. The same is true of certain malformations of the chest, and of certain displacements of the parts within it. In all such cases, the production of the dropsical accumulation may be accounted for upon the same general principles as have been applied to the explanation of cardiac dropsy.

RENAL DROPSY.

Renal dropsy is marked by other and peculiar characters. We may be induced to suspect that dropsy, in a given case, is connected with renal disease, —1, by the absence of any direct symptoms of cardiac disease : 2, by the complexion of the dropsical person : 3, sometimes by certain parts of his previous history : 4, by certain conditions and qualities of his urine.

It is necessary to premise that it is not every disease of the kidney that leads to, or is connected with, the production of general dropsy. Suppuration of the gland may occur ; it may contain calculous matter ; there may be hypertrophy or atrophy of one or both of the kidneys ; and yet from first to last neither dropsy nor any apparent tendency to dropsy. Here, again, therefore, as in the former case, the question is suggested, With what kind or kinds of renal disease is dropsy apt to be associated as a consequence ?

We shall find, indeed, in the course of our inquiry, that even those special alterations in the texture and appearance of the kidney, of which dropsy may be and often is a symptom, do not always, or necessarily, give rise to that symptom, but may pass through several stages, and prove directly or indirectly fatal, without any appreciable accumulation of water in any part of the body. Yet dropsy is frequently dependent, in part or altogether, upon these special changes in the kidney ; and for the present we propose to take into consideration those cases of dropsy which result entirely from disease of the kidney, and which may accordingly be called cases of pure *renal dropsy.*

The not uncommon occurrence, and the great importance, of this form of disease were first pointed out, about thirteen years ago, by Dr. Richard Bright, to whose sagacity and observation we still owe the greater part of our actual knowledge, both of the connexion which so frequently subsists between dropsy and disease of the kidney, and of the peculiar changes which that gland and its proper secretion undergo in such cases.

The morbid appearances presented by the substance of the kidney are such as denote some change in its intimate structure. Its cortical (or secreting) portion is the primary and chief seat of this change ; yet what is called its medullary (*i. e.* its excreting) part is also sometimes implicated, but in a less degree.

These morbid appearances relate to the size, figure, and consistence of the organ ; to the colour and condition of its surface and of its interior. With respect to some of these appearances, considerable variety occurs in different cases ; and this variety is probably connected more or less with different stages of the disorganizing process. Thus, with regard to the *size* of the diseased glands, they are sometimes much larger than natural ; sometimes of the ordinary magnitude ; sometimes considerably smaller. The average weight of the adult human kidney is four ounces. M. Rayer has met with some, in this disease, weighing twelve ounces. The increment and the decrement of the natural bulk belong principally, if not altogether, to the outer secreting portion of the gland. If a longitudinal section of an exaggerated kidney be

made, the cortical part is seen to be unduly broad ; and the same part is evidently narrow when the whole organ is smaller than common. For this reason, in the latter case, the radiating medullary parts approach nearer to the surface than they are observed to do in a healthy kidney. Furthermore, it would appear that the enlargement is most commonly coincident with the earlier, and the contraction or shrinking with the latter, periods of the renal disease.

The *consistence* of the diseased gland is also variable. Sometimes, and for the most part in the earlier periods, it is soft and flabby ; sometimes, and especially in the later periods, it is remarkably compact and hard. The size and the consistence of the kidney may be said to be, in most cases, inversely proportional to each other.

Again, the *form* of the kidney, in the disease in question, often undergoes some modification. As the special change proceeds, the exterior of the gland shows a tendency to become indented by linear depressions, and to present a lobular shape. This, however, is by no means a constant phenomenon, even in the most advanced stage of the malady.

When the proper investing tunic is stripped off, and less distinctly through the same tunic before its separation, the surface of the kidney appears mottled, marbled, or stained ; of a yellowish-gray colour in one place, and of a dark or purple tint in another ; occasionally it is pale throughout its whole extent ; more commonly of divers hues, and variegated with little streaks which are portions of veins containing red blood ; sometimes the surface is curiously speckled, often uneven, as if strewed with prominent grains, in some instances quite rough and scabrous.. These several appearances are usually the more conspicuous, in proportion as the complaint is the more advanced.

The most uniform, however, and characteristic of the morbid appearances are those presented by the cut surface of the kidney when it has been divided into two symmetrical portions by a longitudinal incision. We then perceive that the cortical substance is the main seat of the morbid alteration. It has lost in a greater or less degree, or sometimes almost entirely, its natural red colour and uniform aspect ; sometimes it puts on a speckled or granular appearance ; but this, in our experience, is less common than a pale homogeneous surface, streaked in general by linear marks, and bearing, when well pronounced, a near resemblance to the section of a parsnip. The view of the incised surface conveys to an observer the notion of some deposit having taken place, whereby the natural texture of the part is obscured, and its blood-vessels are, many or all of them, emptied or obliterated ; while the healthier medullary masses are displaced and pushed aside ; sometimes compressed and encroached upon ; sometimes exhibiting the same yellowish appearance interposed between, and opening out, their radiating striæ. In several instances, along with these changes of appearance and structure, we have found the veins that emerge from the kidney blocked up by firm coagula of blood.

The kidney, in some rare cases, is studded, both on its surface and throughout its interior, with numerous small cysts or cells containing a thin transparent fluid. These cysts have been inaccurately called hydatids. It is not at all uncommon to meet with one or two such cysts in this diseased state of the organ.

It has been made a question whether the various appearances now described, which sensibly differ in degree and combination in different cases, are characteristic of different morbid conditions, or merely of different stages and varieties of the same essential change. Our knowledge of this subject is scarcely sufficient to supply a positive solution of this question. Excepting, perhaps, the cyst, the writer's opinion is in favour of their all being accidental forms and effects of one and the same morbid process. It is proper, at the same time, to state that both Dr. Bright and Dr. Christison appear to incline to the opposite conclusion.

There is still another state of the kidney very different, in its appearance, from any that have yet been mentioned, which is thought however to be in some cases, if not always, the first stage of all in the disorganizing process. Without prosecuting for the present the inquiry how far this notion may be founded in truth, we shall describe the state in question. It may be briefly expressed in two words—*sanguine congestion.* The whole organ is gorged with blood, which sometimes drips freely from it when it is cut open. The kidney is in general somewhat flabby, of a deep and dark red, even of a chocolate or purplish colour, nearly uniformly diffused, except that the exposed surface is usually diversified by still darker tuft-like spots, which have been ascertained to be the Malpighian bodies filled with blood.

Of the minute or intimate changes upon which these remarkable morbid appearances depend, we shall be better able to state what is known, and what has been conjectured, when the symptoms and circumstances of the whole disease shall have been more particularly described.

We have already stated that the renal disease of which we are speaking, and about to speak, does not reckon *dropsy* as one of its constant or essential symptoms. We know this, 1, because the dropsy, in many cases, appears to supervene only when the renal disease has reached a certain point in its progress : 2, with more certainty, because the dropsical accumulation is often removed for a time, or even permanently, when we have no other ground for supposing that the physical condition of the kidney has undergone any alteration for the better; nay, when the dropsy having been cured, we find by examination after death that the renal disease was marked in degree: and 3, and still more surely, because the renal disease is often unequivocally detected as having been present, by inspection of the dead body, or by definite symptoms during life, though there has never been any dropsy at all. Yet the dropsy is a most important incident of the disease, both as frequently constituting most of the distress and much of the danger which attend its progress ; and as being the circumstance which in very many, nay, in most cases, first directs our attention to the probable existence of the renal disorder.

The writer's object, it must be remembered, is not to deliver a complete account of this most interesting, formidable, and common disease of the kidney, but to consider it simply in its relations to the subject of *dropsy.*

Let us investigate somewhat more closely those circumstances which, during the lifetime of the patient, conduce to the conclusion that the dropsy under which we see that he labours is renal.

1. There is nothing, that we are aware of, very peculiar or distinctive in the characters of the anasarca itself. When the renal disease sets in suddenly and with acute symptoms, dropsy usually supervenes soon. So also, during its more chronic progress, anasarca is apt to show itself, or to increase, whenever inflammation of any part, or febrile disturbance, happen to ensue. The more rapid and copious the effusion, the less do the dropsical parts pit upon pressure. Of this renal form of the disease it may also be stated, that an accumulation in the larger serous cavities is not, in general, a prominent feature.

2. We naturally look, in a case of general dropsy, for evidence of disease in the thorax, especially of the heart, and most particularly of retarded circulation in the veins. If we find no material or adequate embarrassment of the respiratory functions, no deviation from the natural sounds of the heart, no derangement of its regular movements, no alteration in the force of its pulsations, or in the space over which they may be heard and felt, no distension of the large veins of the neck ; we then have reason to suspect, at least, that the anasarca is connected with some vice of the kidney.

3. Again, our judgment is guided or assisted, in some degree, by the complexion of the patient. When general dropsy depends upon disease of the heart, the cheeks and lips are occasionally florid, often purplish or livid, frequently dusky and loaded : sometimes (as in chlorotic women, where the heart may be

temporarily distended without any strictly organic disease, and the blood is thin
and poor) the face and mucous membranes are pale : but in the renal variety of
dropsy there is commonly a strikingly characteristic hue ; an evident want of
red blood, indeed in the capillaries, but an unhealthy, dingy sallowness withal,
an aspect such as reveals to an experienced eye the existence of some visceral
disease in the abdomen.

4. Our suspicion that the kidney is the organ in fault is strengthened, if we
trace certain accidents in the history of our patient. An attack, for example, of
illness, attended perhaps with temporary swelling of the body and disturbance
of the urinary functions (acute dropsy, in short) soon after some exposure, under
unfavourable circumstances, to the influence of cold, either applied to the external
surface or to the stomach, by a draught of cold drink. For there is reason to
believe, that in acute dropsy is often laid the foundation of those peculiar changes
in the kidney, which, since they were first pointed out by Dr. Bright, have been
chiefly studied in their connexion with chronic dropsy ; that as rheumatic car-
ditis may occur, and become latent as to its effects for some time, and yet
implant the germs of future cardiac dropsy, so the stress or strain (of whatever
nature it be) that befalls the kidney in cases of febrile dropsy, may set on foot
a morbid process which long works silently and unobserved, but which, at last,
gives notice of its operation by symptoms, the reproduction of dropsy in a more
chronic form being the most significant symptom of all. The acute attack may
have been forgotten ; there having been no obvious (though there may have
been ill understood) indications of the renal affection ; and its existence has been
unsuspected. On this account we have thought it best to postpone the conside-
ration of acute or febrile dropsy ; and these are points to be more closely exa-
mined hereafter.

The previous history of intemperate habits would be of importance also in
aid of our diagnosis, if these same habits had not a like influence in causing
disease of other organs as well as the kidneys, and especially of the heart.
There may, however, be no such episodes as these in the history of the patient :
the dropsy may have come on immediately after some exposure or obviously
injurious influence, yet not with acute symptoms, and in a temperate subject :
in which case it is probable that the renal disease had pre-existed in a latent
state ; or the anasarca may have arisen by degrees, and without any apparent
exciting cause. Suppression of the catamenia, and blows on the loins, have
each been precursory of this form of dropsy, sufficiently often to raise a sus-
picion that the change in the kidney has been somehow a consequence of these
accidents.

5. The most remarkable and sure evidence of the existence of the renal dis-
ease is to be found in the state of the urinary secretion. Some of the charac-
teristic qualities of the urine are very obvious, or easy of detection when sought
for ; others require for their discovery some little chemical knowledge and skill.

The more obvious characters of the unhealthy urine relate to its quantity, its
sensible qualities, the presence of albumen in it, and its specific gravity. And
because they are obvious, these are the circumstances which, for the generality
of practitioners, are of chief importance, and most require to be attended to and
understood.

The quantity of urine secreted in this disease of the kidney is inconstant. It
always falls short of the ordinary standard, in the outset of the dropsy. In the
acute cases, also, and whenever febrile symptoms supervene in the chronic, it is
invariably diminished. And by this deficient expenditure of aqueous fluid
through the kidneys, while the exhalation from the surface is also scanty or
annulled (as in most instances it is found to be), may be explained, in great
part, the occurrence of the dropsical accumulation. As the disease advances,
the urine often returns to its natural amount ; and not unfrequently is secreted
in excess.

The average quantity of urine voided in the twenty-four hours by a healthy

adult, has been variously estimated. It may safely be put at about two or two
and a half imperial pints ; that is, from forty to fifty fluid ounces. Sometimes
in the disease in question it does not exceed one or two ounces, or is even sup-
pressed altogether ; and when this is so, the patient must be considered in im-
minent danger of some fatal affection of the brain. More generally, the patient
voids from half a pint to a pint and a half of urine daily. In certain cases, or
in certain stages of the disease, and chiefly in the advanced stages, the quantity
may reach four or five, or even six pints daily. These observations are to be
understood as having no reference to the effects of diuretic medicines.

It may be stated as the rule, that the dropsy lessens as the urine becomes
more copious and contrariwise. But to this rule there are numerous exceptions.
The dropsy may even augment while the quantity of urine is increasing. In
such cases other agencies are probably in operation besides the mere kidney
disease, such as debility of the muscular parietes of the heart engendered by
the disease, or an altered and more aqueous condition of the blood, to be more
particularly described hereafter.

Whenever we find anasarca steadily persisting, or perhaps extending, while
the quantity of urine, uninfluenced by diuretics, exceeds the average proper to
the patient, we have reason to suspect the dropsy to be renal. The same phe-
nomenon is, however, sometimes to be observed in the cardiac form of the com-
plaint, as well as in the anasarca that occasionally supervenes in the latter stages
of diabetes.

The sensible qualities of the urine are variable also, and differ at different
periods of the disorder. Often it is dingy and dark-coloured, brown, like
slightly turbid beer ; sometimes it is distinctly, sometimes obscurely, tinged by
the colouring matter of the blood ; frequently it deposits a dark-brown, or soot-
like powder, which is evidently composed of the coloured particles of the blood,
changed in appearance, and probably blackened by the acid in the urine. Often,
also, the urine is of a pale hue, not quite transparent, hazy, exhaling but little
of the characteristic smell of healthy urine, frothing readily, and long retaining
its head of froth. This depends on the copious presence of an unusual ingre-
dient, to be presently mentioned. Sometimes, but not very frequently, the urine
throws down more or less of the common lateritious sediment, and paints the
bottom of the vessel pink. Sometimes, again, the secretion does not deviate
materially, or appreciable in its appearance from that which belongs to health.
Of these several appearances, that which manifestly arises from the admixture
of a greater or less quantity of blood, is the most to be relied on as indicative
of the renal disease. It is most common in the early stages of the dropsy ;
and in the acute variety these sanguineous impregnations are rarely, if ever,
absent.

A still more remarkable and important quality of the urine in these cases is
that it contains albumen. This substance is not to be found, at least in appre-
ciable quantity, in the urine of health. It was noticed long ago by Dr. Wells,
and by Dr. Blackall, that in certain forms of dropsy the urine was albuminous.
It was this same quality that most arrested Dr. Bright's attention also in the
outset of his valuable researches into this subject. More particulars respect-
ing the albuminous impregnation have been since determined by himself and
by others, and especially by Dr. Christison.

This is a circumstance easily recognised, although it does not constitute one
of the sensible qualities of the urine. In a work of this kind it is necessary
to specify the means of detecting the albumen, and to point out the limitations
within which only it is to be considered a sign of disease in the kidney.

Albumen begins to solidify at the temperature of 160° Fah. ; but when di-
luted it may require for its complete coagulation, the heat of 212°. Hence
on one simple test of its presence: we discover the admixture of albumen
with the urine, by heating that fluid to the boiling point. This may be most
conveniently done in a small glass tube, by the flame of a spirit lamp. The

use of such a tube is preferable (as Dr. Christison has shown) to the common expedient of a spoon, for it enables us to measure with greater exactness the quantity of albumen deposited.   When, as is sometimes the case, albuminous urine is already turbid from the admixture of the lithates, these dissolve as the heat is applied, and the urine first becomes clear ; then, as the heat is increased, the albuminous cloud begins to be visible.   Suspected urine may be hazy also in consequence of its containing mucus : when its transparency is much troubled, it is well to filter the fluid before testing it.

The phenomena observable in the heated urine vary in different cases, chiefly by reason of the variable quantity of albumen which is previously held in solution. The whole is sometimes converted into one gelatinous mass : but this is uncommon. Usually the albumen first appears in the form of a whitish cloud, of which the constituent particles multiply, and collect, in proportion as the quantity is considerable, in small curdy fragments or flakes.   These soon subside to the lower part of the tube, leaving the supernatant liquid clear. The amount of albumen is of course to be estimated by the portion of the tube that it occupies.

Dr. Christison has proposed certain terms indicative of the degrees in which the urine is found to coagulate in different cases ; which terms, or some others of equivalent import, it is extremely desirable that physicians should generally adopt, in order to reduce the results of their diversified experience to the same scale.   His nomenclature comprises seven degrees of coagulability.

1. *Gelatinous by heat.   Very strongly coagulable*, where a precipitate distinctly separates by heat, and yet occupies, in twenty-four hours, the whole or nearly the whole fluid.   3.   *Strongly coagulable*, where the precipitate in twenty-four hours occupies half the volume of the fluid.   4. *Moderately coagulable*, where it occupies a fourth of the fluid.   5.   *Slightly coagulable*, where it occupies an eighth of the fluid.   6.   *Feebly coagulable*, where it occupies less than an eighth of the fluid. 7.   *Hazy by heat*, where the urine becomes cloudy, but does not form visible flakes a few seconds after being boiled.   In appreciating the last degree of impregnation, it is convenient to heat only the upper half of the fluid in the tube.

But this test of heat is not conclusive nor sufficient.   There are circumstances that may impede or prevent its effect in, coagulating albumen, which is nevertheless present.   On the other hand, it may under other circumstances produce a fallacious appearance of albumen where none exists.

Albuminous urine has, ordinarily, a less acid reaction with litmus paper, than healthy urine.   This fact is explained by the theory which accounts for the presence of the albumen ; namely, that a portion of the serum of the blood, containing salts of soda, is mingled with the altered secretion. In consequence of the abundance of the serum, or of the previous administration of certain drugs, or from other causes, the urine, when recently discharged from the body, may be neutral or alkaline ; or it may become neutral, or alkaline, by spontaneous decomposition after its removal from the bladder : in any case the urine thus alkaline or neutral will not coagulate when heated, even though it may be full of albumen.   Again, though there be no albumen, heat may cause a flaky precipitate, consisting of the earthy phosphates.

We avoid, or remedy, these sources of fallacy, by testing the suspected urine with nitric acid, which has the property of precipitating the albumen in a flaky or pulpy form.   It will thus detect albumen when the tested urine is alkaline ; and by restoring its acidity it will make the albumen discoverable by the test of heat. It has likewise the effect of re-dissolving the spurious precipitates which may be thrown down by the application of heat, and consequently of showing that they are spurious.

Nitric acid alone however is not, any more than heat alone, an unequivocal criterion, in its effects, of the presence or absence of albumen.   For it may occasion a flaky precipitate of lithic acid, when there is no albumen.   But this

defect is compensated by the complementary test of heat, for the precipitate is re-dissolved by raising the temperature of the urine, while any coagulated albumen remains insoluble.

Moreover we are informed by Dr. Christison that in his experience " sometimes nitric acid added in excess did not separate albumen which had been present in large quantity—a fact which is probably to be ascribed to the albumen itself having undergone more or less decay along with the other principles of the urine." (On *Gran. Degen. of the Kidney*, p. 45.) Hence the urine should, if possible, be examined before it has become decomposed by lapse of time. By the employment, however, of both these tests, with different portions of the same urine at the same time, and with the same portion in succession, we avoid all risk of mistake.

Although the volume of the coagulated albumen may be considerable, its weight is insignificant. According to Dr. Bostock, water which contains only $\frac{1}{1000}$th of its weight of albumen is rendered opaque by boiling. And Dr. Christison tells us that one part of albumen by weight, in 100 parts of urine " will render it almost a thin uniform pulp when heated." The largest quantity he had met with was 27 parts in 1000.

There are other tests frequently spoken of, and sometimes recommended; particularly the ferrocyanate of potass, corrosive sublimate, creasote, and oxalic acid. They are unnecessary in addition to heat and nitric acid, and they are liable to fallacies, from which these last, when combined, are free. They are mentioned here, therefore, with a caution to the merely practical physician to avoid them. To an expert chemist such a caution is, of course, superfluous.

But the urine may contain albumen, when there is no disease of the kidney. This circumstance has given occasion to much controversy, and has thrown a needless shadow of doubt over the true relations that obtain, in the disease we are considering, between the gland and the quality of its secretion.

The recorded evidence of numerous observers concurs in establishing the facts,—1. That urine which is albuminous may, or may not, be connected with renal disease; and 2. That the cases in which it is so connected are, in general, easily distinguishable from the cases in which it is not.

It is certain that some articles of food have the effect, in some persons, of rendering the urine for a time albuminous; perhaps it would be more correct to say that certain forms of indigestion cause this change. Albumen has been detected in the urine in that general state of irritation produced occasionally by mercury, or by a blister to the skin. In the crisis of some febrile disorders, and in some cases of pregnancy, the same phenomena has been observed. Whenever blood, proceeding from any part of the long tract of mucous membrane which lines the urinary organs, mingles with the urine, that fluid of necessity contains albumen, and coagulates when tested by heat or nitric acid.

On the other hand, when the kidney is really affected in the way already described, the admixture of albumen with the urine is apt to disappear, for a while, even suddenly. We have known it disappear for several hours immediately after the effectual application of a hot air bath, and after profuse purging by a full dose of elaterium. Sometimes it is absent for a longer period.

Nevertheless, if the urine, for a considerable space of time, be pretty constantly impregnated more or less distinctly with albumen, if the albuminous condition of the urine be concomitant with anasarca, particularly if the urine be deeply charged with albumen, and more especially if another remarkable alternation be observed, namely, a sensible diminution of the specific gravity, no reasonable doubt can remain that the kidney disease is in progress.

3. We ascertain, therefore, the destiny of the suspected urine.

More exact observations in regard to this point, also, have been made and published of late years, especially by the late Dr. James Gregory, junior, of Edin-

burgh, and by Dr. Christison. The same discrepancy is to be regretted in the statements of different authors respecting the average specific gravity, as respecting the average quantity, of healthy urine. While Dr. Prout places it any where between 1010 and 1015 (that of distilled water being 1000), M. Solon describes it as ranging from 1020 to 1024, and Dr. Christison estimates it at 1024 or 1025 We shall assume the latter to be the nearest to the truth, both because it is avowedly founded upon the results of numerous trials, and because, if it be not exact, it is less likely than the number given by Dr. Prout, to lead us into erroneous conclusions in reference to the disease in question.

Perhaps it is scarcely requisite to admonish the reader that the question of specific gravity must always be contemplated in relation to the absolute quantity of urine secreted. The specific gravity depends upon the proportion of the solid constituents of the urine contained in a given quantity ; if the aqueous portion be augmented, the effect upon the absolute density will be the same as if the solid contents were proportionally diminished. But when, as frequently happens in this renal disease, the specific gravity decreases while the quantity of the urine decreases also, that conjunction of phenomena becomes especially significant.

The three circumstaaces that now have been mentioned,—all of which it is easy to determine, namely, the quantity of urine secreted in a given time, its impregnation with albumen, and its specific gravity,—constitute, together and by comparison with each other, a very accurate and trustworthy test of the presence or absence of the renal disease.

It has just been stated that the albumen not unfrequently disappears, capriciously as it were, even early in the disease, for a time. But it is no less true that it sometimes ceases altogether, although the renal disease may be fixed. This is most often the case in the advanced stages of the disease. The general rule is that the albumen is plentiful and almost constant in the outset of the malady, less certainly present as it proceeds ; and sometimes entirely absent in its latter periods. Now it is of importance to remark that the alteration in the specific gravity of the urine follows a contrary law. The declension of density, so far from being corrected, augments with the progress of the disorder. Hence the one of these morbid phenomena is a valuable check upon the other, considered as an index of what is going on in the kidney.

At first the specific gravity is not much below the natural standard ; but it sinks from 1020 perhaps to 1016, and at length, as the renal malady increases, to 1010, 1008, and even lower. Solon once noticed it as low as 1003, when the diurnal quantity was 44 ounces. The lowest density ever noted by Dr. Christison, the quantity not being in excess, was 1004. We may, with Solon, place the average of specific gravity of the urine in this complaint at 1013.

Allowing always for the quantity of the secretion, if we find that albumen ceases to manifest itself on the application of the proper tests, and the density be decidedly low, we must not be led to infer or hope, merely from the absence of albumen, that the kidneys are sound.

These characters of the urine, rightly weighed and interpreted, reveal therefore not only the existence of the renal disease, but also, with great probability, the stage or degree it has reached.

There are yet, as has already been intimated, other altered qualities of the urine in this disease, very curious in themselves, but requiring for their detection a greater expenditure of time, and more chemical knowledge and dexterity than the qualities already passed in review. They are, on that account, of less practical value to most practitioners ; yet they deserve to be known, both as forming an important portion of our science on the subject, and also as furnishing data for speculation in respect to the nature and cause and mutual relation of some of the more obvious symptoms.

The specific gravity in this malady of the kidney being unnaturally low,

notwithstanding the presence of the new substance, albumen, it follows as a matter of inference, and it is found as a matter of experience, that the solid constituents proper to the urine when healthy are sensibly diminished. These solid ingredients consist mainly of urea, and of certain saline matters. In a secretion so variable in its quantity, density, and composition, no fixed or absolute ratio of these ingredients can be assigned, either between themselves or to the liquid in which they are contained. But, in renal dropsy, the average ratio of the solids to the aqueous portion of the urine is plainly lessened. The average quantity of urea has been found to lie between three and four per cent. of the weight of the urine, and the average quantity of the salts between two and three per cent. Dr. Christison ascertained that in a state of health, the specific gravity of the urine being 1029, and the quantity voided in twenty-four hours being 34 ounces avoirdupois, the aggregate of its solid contents amounted to 67·7 parts in 1000. This result coincides almost exactly with that of the analysis published by Berzelius, according to which, 1000 parts of urine contain 933 parts of water.

In trials made by Dr. Christison, the quantity of solid ingredients in the urine of patients labouring under renal dropsy has been found diminished to one-fifth, and in an extreme case to nearly one-twelfth, of the average proportion ; and he estimates the decrease of the urea as being fully answerable to the diminution of the other solid constituents. Now it has been conjectured by Solon and others, (and the conjecture was a natural one,) that the albumen might be formed by a sort of conversion at the expense of the urea; since these two substances, by slight alteration in the ratio of their elements, pass respectively each into the other. But this conjecture has been shown to be unfounded. Ten years ago Dr. Christison had observed, that when the urine was deprived of the greater part of its urea, the quantity of albumen contained in it was small ; and, on the other hand, in cases where the urea was considerable in quantity, the albumen also was plentiful. In his recent work on this subject Dr. Christison states that the whole of his subsequent experience has been in conformity with this observation.

The same conclusion, namely, that the albumen is not vicarious of the urea, is supported by the remarkable fact that coincident with albumen in the urine, urea has been found to exist, in considerable quantity, in the blood, where, during health, no trace of it can be detected. And this leads us at once to consider the principal alterations which the blood undergoes in this disease. Upon this subject we are greatly indebted to the researches of Doctors Bostock, Christison, Babington, and G. H. Barlow. We have indeed much less frequent opportunities of examining the blood than the urine ; and the inquiry has hitherto been less fertile of practical indications ; yet it is full of interest, and deserves to be carefully followed out.

It has been ascertained, then, 1. That in the disease we are considering, the blood often contains urea. 2. That the serum of the blood is apt to be of a lower specific gravity, and to be less albuminous, than in the healthy state. 3. That the proportion of its fibrin varies. And, 4. That the colouring matter of the blood gradually decreases in quantity during the progress of the disease.

Modern physiologists are agreed that urea is not formed by the kidneys, but merely abstracted by those organs from the blood as fast as it is received or generated there. Whenever this process of separation is suspended or defective, a portion of urea remains in the circulating blood, and may be detected by its proper tests. Urea has been thus discovered in the blood of animals after the extirpation of their kidneys. In the blood of patients afflicted with renal dropsy it has been found as plentiful even as in their urine. And not in the blood only, but in the various fluids derived from the blood ; and particularly in the liquids effused into the ventricles of the brain, into the pericardium, pleuræ, and peritoneum.

According to Dr. Christison, whenever there is a material reduction of the

daily discharge of urea by the urine, it may be distinctly found in the blood; but not otherwise. And he considers the reduction to be material if the quantity excreted be diminished to about one-third of the natural amount.

Again, the serum of the blood has been ascertained to contain in this disorder a less than common share of albumen, and to be of an unnaturally low density. The average specific gravity of healthy serum is 1030. It is apt to be reduced to 1024, 1020, and even to 1013. Dr. Babington declares that in cases of coagulable urine, he has always found the specific gravity of the serum much below the healthy standard. The quantity of albumen in healthy blood averages from 65 to 69 parts in 1000. In this disease, Dr. Babington has met with as little as 16·10 parts.

The general truth of these statements is corroborated by the results of Dr. Christison's experience; but the information which he renders is more precise. He has noticed that a definite but inverse relation subsists between the coagulability of the urine and the density of the serum; that the more albumen there is in the former, the lower is the specific gravity of the latter fluid. Hence it is, in the earlier periods of renal dropsy, that the density of the serum is the most diminished, inasmuch as the urine is then most highly charged with albumen.

In proportion as albumen, with the progress of the malady, becomes less perceptible in the urine, it becomes more abundant in the serum; the specific gravity of which returns towards, and may reach, the degree that belongs to health. But in all stages of the disease, whenever albumen appears plentifully in the urine, as during febrile reaction, the density of the serum sinks.

It would appear therefore, that the presence and proportions of albumen and urea in the urine do not depend upon any vicarious conversion of one of those substances into the other, but upon reciprocal alterations in the normal components of the blood and the urine; the deficiencies of the one fluid balancing the superfluities of the other.

Again, it results from the concurring experience of Dr. Christison and Dr. Babington, that the ratio of the fibrin in the blood is usually increased in the early stage, and during the existence of febrile disturbance in any stage of the disease. At the same periods, the blood presents the buffy coat. Under ordinary circumstances, after the early stage has gone by, the quantity of fibrin most commonly reverts to the natural proportion.

In healthy human blood, Dr. Christison has found the quantity of dry fibrin to vary from 25 to 52 parts in 10,000. During the early stage of the renal malady, he has known it as high as 82, and as low as 30 parts.

Reaction being present, he has met with as much as 85 parts in the middle stage, and 56 parts in the advanced stage. Under other circumstances, it commonly ranges between 27 and 43 parts.

Lastly the colouring matter of the blood, which is but little if at all affected in the outset, diminishes gradually where the disease continues, and at length is so much reduced as to form less than a third of the healthy average. If venesection be occasionally employed, this process of depravation is accelerated; but it takes place whether blood be artificially withdrawn from the system or not.

"I am acquainted," says Dr. Christison, "with no natural disease, at least of a chronic nature, which so closely approaches hæmorrhage in its power of impoverishing the red particles of the blood."

In the male sex, the healthy proportion of the hematosine is 1335 parts in 10,000. Dr. Christison has seen this reduced, in a young man ill three months and a half, subsequent to scarlatina, who had never been bled before, to 427. This change in the blood is invariable.

It has been already stated, that dropsy, however frequent, is not a constant or necessary consequence of that renal disease, for which, since it was made known to us by Dr. Bright, no unexceptionable name has hitherto been devised. There are other symptoms, which also very commonly present themselves in the

course of the same disease, but are not essential to it. They often accompany and complicate the dropsy, and therefore claim our notice in this place.

One of the most common and most important of these complications, is the occurrence of what are compendiously called head symptoms; various manifestations of derangement in the cerebral functions; headache, drowsiness, delirium, epileptic seizures, apoplexy. So frequently, indeed is the death of the patient preceded by convulsions or coma, that Dr. Christison has rightly considered this to be the " natural termination" of the disease, or " the mode in which it proves fatal, when life is not cut short by some other incidental or secondary affection." Of seventy fatal cases observed by Dr. Bright, death was ushered in by well-marked cerebral symptoms in thirty.

The circumstances under which these affections of the brain takes place, have been ascertained with tolerable accuracy. They are almost always preceded by a great diminution, or an entire suspension, of the secretion of urine. This connexion of coma with suppression of urine has long been recognised, and it is well exemplified in the disease under consideration. If the quantity of urine becomes very scanty, so as to amount to no more than two or three ounces in the twenty-four hours; and especially if the deficiency occurs suddenly; and more particularly if there be a total cessation of the secreting function, we may reckon upon the speedy dissolution of our patient, and that he will die comatose, and perhaps after convulsions. But this rule is not so strict as to offer no exceptions. Occasionally, though seldom, it happens, that the urine is reduced to a very small amount, while the head remains unaffected. Of this Dr. Christison records a remarkable instance. One of his patients passed no more than two ounces of light urine daily for nine days before his death, yet he remained sensible to the very last minute of his existence, and died simply of inanition. Somewhat less unfrequently apoplectic symptoms arise and carry off the patient, although there has been no extreme or material reduction in the quantity of urine.

When a case has terminated in this manner, serum is sometimes found accumulated in unnatural measure in the cerebral ventricles, and in the tissue of the pia matter. The dropsy has extended to the brain. And under these circumstances, although it may be difficult or impossible to determine when and with what rapidity the serum has been effused, its presence and its pressure may fairly be assumed to have produced the fatal symptoms. That this is one, at least, among the causes of the coma, is rendered the more probable by the connexion that may sometimes be noticed between the coming on of that state, and the visible increase of the dropsy in other parts of the body. The experience of the writer accords fully with the following remark of Dr. Christison: " If the dropsical fluid be allowed greatly to accumulate, drowsiness, the first symptom of the affection of the head, very soon makes its appearance in the generality of cases, and it will speedily pass to fatal coma, if not controlled; but the removal of the dropsy will usually remove the drowsiness."

In many instances, however, there is found no morbid collection of water within the skull, nor any appreciable change; and in some instances there is no dropsy of any part: and this fact, taken together with the usual failure, in the quantity of urine, and the ascertained presence, sometimes, of urea in the blood, and even in the natural serosity of the encephalon, has led to the construction of a theory, which refers the ultimate symptoms, the stupor, and the death, to the poisonous influence of the urea of the unpurified blood upon the brain and nervous system. The theory is ingenious and plausible, and, to a certain extent, it is probably true; but it cannot yet be regarded as being fully proved, and some of Dr. Christison's observations are even calculated to raise a strong doubt of its soundness. He states that he has repeatedly known the daily discharge of the solids of the urine to be reduced, for weeks together, to one-fourth of the natural amount; while, moreover, the analysis of the blood showed that it was loaded with urea, without the appearance of any symptom of an affection

of the head.   Dr. Bright also records a case to the same purpose.   A person labouring under this disease of the kidney lived for four or five years under his occasional observation.   The blood was analyzed in the earlier stage, and found to contain a large quantity of urea, as much as the urine itself contained.   Yet this patient had no fits till towards the close of his life.   (*Guy's Hosp. Rep.* p. 360. Case vi.)

Another not improbable hypothesis connects the supervention of stupor and coma with the pale and watery condition of the blood.   That similar symptoms are apt to arise in conjunction with a similar defect of hæmatosine, has been well known since the publication of the remarks of the late Dr. Gooch, and of Dr. Marshall Hall, on that peculiar form of cerebral affection.   It would seem that, in such cases, the functions of the brain are exercised irregularly, languidly, and at length not at all, in consequence of the failing supply of its appropriate stimulus through the arteries.

Another striking circumstance observable in this disease, is a readiness of various organs of the body to inflame, and particularly of the serous membranes. According to M. Solon, this disposition has not been so manifest in France; but of its frequent appearance in this country, the writer can add his own testimony to that of Drs. Bright, Christison, and Gregory.   Such intercurrent acute inflammation is a not uncommon cause of death.   The pleura is much more often affected in this manner than the peritoneum or the pericardium.   Among 100 cases, recorded in a tabular form by Dr. Bright, the pleuræ were ascertained to be healthy in 26 instances; in 40 cases, old adhesions were discovered; and in 16, the ordinary evidence of recent inflammation.

It follows from this tendency that, when we come to inspect the dead body, we seldom find the kidney to be the only part in which structural change is manifest.   Most commonly evident traces of disease are met with in various organs.

Disorder of the stomach and bowels is, certainly, a frequent companion of the malady.   Nausea; vomiting; flatulent distension; diarrhœa.

It would appear, however, that these incidental complications prevail with irregular frequency in different places.   They are probably owing, in some measure, to local and peculiar agencies.   Thus, vomiting and diarrhœa have been more familiar to the Edinburgh observers than, in London, to Dr. Bright, or, in Paris, to M. Solon: while the headaches and coma so often witnessed by the British physicians have been comparatively uncommon in France.

All the writers on this subject acknowledge the frequent association of cardiac disease with the renal.   And in respect to this concurrence of structural alteration in the heart and in the kidney, several obvious and interesting, but hitherto unsettled, points of inquiry present themselves.   Some of these we may mention, as being fit subjects for future investigation.

Where both the organs are diseased, which of them suffers the earliest change?   Can the disease in the one be considered as being a cause of the disease in the other?   What respective relation have these diseased conditions to the dropsy?

It is generally difficult, when we find both organs altered in structure, to trace the course of the patient's maladies so accurately as to determine which change has been primary, which consecutive.   It is highly probable, indeed, that, in certain cases, the cardiac disease and the renal disease have no relation to each other as cause and effect, but are both consequences of some general cause; of habitual intemperance, for example.

Is the renal disease ever produced by the cardiac?   We might more easily arrive at an answer to this question, if the real nature of the change which the kidney undergoes were better understood.   In the acute renal cases, when they prove early fatal, the kidney is always found to be gorged with blood.   And the accustomed admixture of blood with the urine warrants the belief that the same condition was present in patients who have recovered.   From this state of en-

gorgement (which is not acute inflammation, since the ordinary events of acute inflammation in that organ do not follow) springs, apparently, the subsequent series of changes. It is therefore a plausible conjecture, that whatever tends to cause congestion of the kidney, tends also to aggravate, and may even produce, the peculiar changes in question. Now that disease of the heart, and especially such disease of the heart as leads to dropsy, occasions congestion of the venous system, and in this way gorges the viscera with blood, is well known. Under this influence the liver often enlarges. So that in a cardiac disease connected with dropsical accumulation we might *à priori* expect congestion of the kidney, and structural alteration in consequence of such congestion.

A serious objection to this view of the matter is presented by the fact, that dropsy often arises from disease of the heart, lasts long, and proves ultimately fatal without the occurrence of albuminous urine, and without any appreciable change of structure in the kidney. It is plain, also, that passive congestion of the kidney produced by disease of the heart cannot be the sole cause of the renal change ; for that change is sometimes well marked, though the heart has been unaffected. A man was admitted into the Middlesex Hospital under the writer's care, with acute articular rheumatism. It was his first attack, and he believed himself to have been a healthy man previously. The membranes of the heart were manifestly implicated ; and as usual, though the cardiac symptoms were controlled, that organ was permanently damaged. After a short period this patient's legs began to be œdematous, and by degrees he became generally dropsical. His urine contained albumen, and was of a low specific gravity. At length he died : and traces of inflammation of the pericardium and endocardium were found, and the peculiar alteration of the kidney. In this instance, which is but a sample of many, the renal disease would appear to have been consequent upon the cardiac. Yet who can say that it had not pre-existed in a latent form, entirely unnoticed, as it daily is, by the patient ? The question is surrounded with difficulties, and we have not yet data sufficient for its solution : but in order that it may be solved, these difficulties require to be plainly stated, and steadily contemplated.

There is no doubt that a considerable portion of cases of granular disease of the kidneys begin in this way ; the disorder of the heart is first produced by the inflammatory action going on in the body, but remains a fixed complaint, and the disease both of liver and kidneys follows as a remote consequence. The dropsical effusions in these cases do not usually take place until the three organs are involved, this is not however an invariable rule. There is a singular analogy between the lesion of the liver and the kidneys, which is apparently of the same nature in both organs.   G.

Conversely, it may be asked, does the renal disease ever cause disease of the heart ? That it may do so is, at least, very conceivable. The heart, no less than other parts of the body, will suffer from the deterioration that has been shown to take place in the blood in these cases. A sort of anæmia is produced ; and it has been already explained that anæmia implies debility of the muscular texture of the heart, and tends to dilatation of its cavities ; and the weak heart becoming irritable also, grows thicker as it labours. And this is the form of cardiac disease which has been found, in many cases, to be coincident with renal dropsy. By Dr. Bright's table it appears that, in 27 cases, no disease at all of the heart could be detected. There were 52 cases of hypertrophy, and of these no fewer than 34 were free from any trace of valvular disease : among the 34 there were 11 instances of disease affecting the aorta. Hence there were 23 cases in which no cause of hypertrophy and dilatation could be found in the heart itself, or in the aorta. The true cause may, therefore, be suspected to have been the renal disease, operating upon the muscle through the quality of the blood.

Where the heart as well as the kidney has undergone organic change, the

disposition to dropsical accumulation will evidently be augmented : but what share these two organs respectively possess in such cases in producing the dropsy it is very difficult, and practically not very important, to determine.

Pain or tenderness of the loins is sometimes an accompaniment of the renal disease ; this symptom is more often present in the early than in the latter stages of the malady. It occurred in one-third of the 28 cases narrated by M. Solon. Dr. Gregory noticed it in the half of his patients.

Irritability of the bladder, or rather a morbid frequency of the call to micturition, has been spoken of by Dr. Bright and Dr. Christison as a common symptom in renal dropsy. It is a symptom, however, belonging to so many other disorders that, taken by itself, it has but little value. The writer has observed it to be extremely troublesome, the urgency being frequent and great, and the quantity of urine voided at each attempt quite trifling, in a case where it appeared to him (and to the patient, himself a physician) to be rather connected with distension of the peritoneum than with the condition of the urine ; the pressure exerted upon the bladder by the surrounding liquid allowing it but little room to expand. Certain it is, that the symptom was always sensibly mitigated after paracentesis abdominis, which was several times performed.

The causes of the disease of which the outline has now been sketched, are obscure. It is clearly ascertained that its most obvious symptoms, in their chronic form, have, in very many instances, begun soon after the exposure of the body to wet and cold under unfavourable circumstances. But it is by no means certain—indeed, the probabilities preponderate on the other side—that, in these instances, the renal disease had not previously existed in its latent state. The influence of external agencies upon the excreting functions of the skin in exciting definite symptoms is beyond question.

It is certain, also, that what is called acute dropsy (to be presently described) arises under similar circumstances of exposure, and is attended with a marked disturbance of the functions of the kidneys. And chronic renal dropsy has sometimes been noticed as occurring in persons who had previously suffered, and had apparently recovered, from the acuter form. Are we not warranted in supposing that the recovery was imperfect in such cases ?—that the kidney had sustained irretrievable injury ?—and that the disease although under treatment, or by lapse of time, it had become tranquil or latent, was ready again to give indications of its existence upon any repetition of its exciting cause ?

The possible dependence, in some cases, of the renal disease upon disease of the heart has been already noticed.

Again, it is a matter of common observation that intemperate habits have often preceded the developement of the disease. Yet we conclude that intemperance is rather a predisposing than an essential cause, from the fact that the complaint is not unknown amongst children, and other persons whose manner of life has been strictly temperate. A marked example occurred lately to the writer in a young girl, fifteen years of age, who had not menstruated. And this leads to another remark ; namely, that dropsy with albuminous urine has been observed not unfrequently to follow a sudden check or suppression of the catamenia. In a few instances, it has seemed to owe its origin to blows received upon the loins, or to extreme fatigue.

The disease occurs at all ages ; less often, however, in extreme youth, than afterwards. Sabbatier records that he saw, while in the service of M. Baudelocque, a young infant affected with anasarca and albuminous urine. The first case described by M. Solon, is that of an infant, seventeen months old, in whom similar symptoms appeared shortly after exposure to cold and wet. In 1838, a boy between five and six years old, anasarcous, and passing bloody and albuminous urine, was in the Middlesex Hospital, under the charge of Dr. Wilson. M. Constant, in the *Gazette Médicale* for 1835, cites the case of a child of five years of age. And M. Rayer gives two plates, representing the kidneys of two children, the one five, and the other six years old, who both died of dropsy, with

albuminous urine, the consequence of scarlet fever. In each of these, the changes described by Dr. Bright were well marked, and the bulk of the kidney was considerably increased.

It is certain, however, that the malady is much more common in adults; not, in all probability, because the system is more readily affected by it at one period of life than another, but because, as life advances, the circumstances which tend to produce or foster it become of more frequent operation, namely, intemperance, exposure to vicissitudes of temperature, fatigue, disease of the heart.

It occurs, probably, for the same reason, oftener in men than in women.

Dr. Christison suspects, that the renal disease happens chiefly in persons of scrofulous habit; and he found it, in several instances, coincident with phthisis pulmonalis. The experience of the writer would not have led him to that opinion. M. Solon doubts whether the co-existence of pulmonary consumption and this renal malady is more than casual. And Dr. Bright states, that "the instances in which phthisis or any form of scrofulous or tubercular disease has been connected with the renal affection, have been decidedly rare."

The same author remarks, that disease of the liver did not occur in more than 18 of his 100 tabulated cases.

After all, the true character of the change that takes place in the kidney, as well as many points in the history of the disorder, remains yet to be discovered. What has been ascertained of its course and probable causes amounts to a presumption, that an undue accumulation of blood in the kidney, passing, perhaps, into chronic inflammation, is at the bottom of those structural alterations, of which the precise nature has not been made out. In some few instances, not numerous enough to disturb the general rule, the organ has been to all appearance sound and pervious by artificial injection, although the symptoms of the disease had been unequivocally pronounced. In many others, new matter appears to have been deposited in the gland, and injections penetrate the altered textures imperfectly or not at all. That the unnatural conditions of the urine depend in part upon a mechanical transudation of certain portions of the blood, which pass through the kidney unchanged as through an inert filter, seems more than probable. Mixed with urine we find serum; its albumen and its salts, diminishing the acidity of the mixture, or even rendering it alkaline; and in many cases the colouring matter also of the blood. As serous liquid oozes through the parieties of the vessels in other parts of the body, and thus becomes the fluid of dropsy, it is easy to imagine that the same process goes on in the kidney; and this conjecture derives support from the fact, that the large veins proceeding from the kidney have often, in this complaint, been found obstructed by firm clots of blood. The natural function of the gland is imperfectly or partially performed; the change which it should effect upon the blood, by purifying it from urea, fails to be accomplished. The albuminous impregnation, and the other altered qualities of the urine when voided, may be explained either by supposing that the secreting power of the whole gland is interfered with, but not absolutely suspended, so that the urine is incompletely elaborated; or by supposing that portions of the gland remain sound and effective, and that true urine is formed by these portions, and mixes with the constituents of the blood, which pass mechanically through other portions of the kidney, already altered in texture, and spoiled, as to their office, by the disease.

That these views are merely conjectural, and that, even if admitted, they are insufficient for the thorough explanation of many of the phenomena which occur during the more advanced stages of this obscure disorder, is freely acknowledged. They are offered, however, in the desire of stimulating further inquiry. Attempts to confirm or to overthrow speculative hypotheses of this kind may lead, at length, to the discovery and establishment of the true pathology.

ACUTE OR FEBRILE DROPSY.

It remains to trace the features of the active, acute, or febrile form of general dropsy, to which frequent allusion has been made in the preceding pages.

The more chronic varieties of anasarca have been shown to depend, in most instances, at least, upon pre-existing disease of the heart, or of the kidney. The febrile kind may take place in a person who immediately before was in sound health. But it is more nearly related to renal than to cardiac dropsy. Its pathology has already been explained. The disease sets in suddenly, and with violence. In most cases it will be found that the patient had recently been exposed to the influence of cold, under unfavourable circumstances; whereby the play of some large secreting organ had been suspended, or materially checked. Hence, as was formerly shown, the retention of an undue quantity of serous liquid in the blood-vessels; hence, again, a disturbed and febrile condition of the circulating system; a gush of serosity soon takes place from the distended capillaries, and the whole cellular tissue of the body, and perhaps some of its serous bags also, are inundated.

The occupation of the cells by liquid is too rapid to be accounted for by the mere detention of the serosity ordinarily exhaled. These are cases to which the term *effusion* is properly applied.

In very many of these attacks, as was observed before, some internal organ suffers acute inflammation, denoted by its peculiar signs. But this is an accident —a coincidence. The dropsy is not the effect of the inflammation. This we know, because inflammation of the same organs is continually happening under other circumstances, without producing dropsy. It is not (for reasons formerly assigned) inflammation of the universal cellular tissue. Both the effusion and the inflammation (when inflammation occurs) are the common result of one cause. But it is important to bear in mind, that when mere dropsy ensues, there is always an approach or proclivity to inflammation. The analogy between dropsy and inflammation is here strongly marked. We have a full hard pulse, flushed cheeks, hot and dry skin, thirst, and furred tongue; smart fever, in short, and even some tenderness of the abdomen and other parts that are dropsical. These parts, it may be presumed, have not yet learned to bear, without resenting, the unwonted tension caused by the included water. The œdematous limbs also resist pressure more, pit less completely and easily, than in the chronic forms of anasarca.

The urine, in febrile dropsies, is scanty and deep-coloured; brown, more or less turbid, like muddy beer. It is full of albumen also, and its specific gravity is somewhat diminished. Often it deposits a brownish or black sediment, consisting of small black grains; and sometimes it is red; either appearance evidently resulting from an admixture of the colouring matter of the blood, more or less changed. These are the phenomena that constitute the link of alliance between febrile and renal dropsies.

It is often stated, as one circumstance by which the acute form of dropsy may be recognised, that the face is the part that first becomes œdematous. The eyelids are puffy and stiff; and the patient, on awakening, opens his eyes with difficulty. The truth seems to be, that the effusion is general, and copious enough to be early perceptible. A slight degree of fulness of the subcutaneous cellular tissue of the face and neck, alters strikingly the character of the features; and when rapidly brought about, forces itself upon our attention. Other parts also escape immediate notice from being covered. In the slower forms of general dropsy, the detention of liquid is equally general; but being, at first, very slight in amount, and the patient not being confined to bed, it is not perceived until it has accumulated, under the influence of gravity, about the ankles.

In these cases, the first injurious impression is made upon the surface of the body, and the functions of the skin suffer. The circumstances under which

such dropsies arise, have been sketched already. A man is somehow exposed to the noxious operation of cold, while hot from bodily exertion, exhausted through fatigue, and rapidly losing his heat by perspiration. Sometimes a large draught of cold drink, taken in that condition, seems to be the immediate exciting cause of the subsequent mischief. Sometimes it is mere cessation from the previous exercise, or sleep indulged, while the external agency of cold continues. The patient soon, perhaps on waking, becomes sensible of a chill ; feels ill and uncomfortable ; and within twenty-four or forty-eight hours, feverish disturbance is set up ; the respiration is embarrassed ; vomiting and diarrhœa not unfrequently occur ; and the anasarcous effusion commences. The profuse perspiration was checked ; that large proportion of liquid excretion, which should pass outwardly through the integuments of the body, is retained and diverted ; and the healthy working of the circulation is violently interrupted.

That the functions of the kidneys, which are in so great a measure complemental of the functions of the skin, should sustain a proportional derangement, is what we might expect ; and the altered qualities of the secretion, the bloody or albuminous condition of the urine, testify, invariably, the strain which these organs undergo. Sometimes, though not often, death is the early result of the attack, and it is usually preceded by an extreme deficiency, or an absolute suppression of the urinary secretion, and by coma. In all the fatal cases of febrile dropsy that have fallen under our observation, the kidneys have been found large, of a dark chocolate or purplish-red colour throughout, turgid with blood, that seemed to be venous. We regard these appearances as being evidences of excessive congestion, rather than of inflammation, because neither the ordinary and striking symptoms of nephritis, nor the unambiguous products of inflammatory action, are usually observed in such cases. We have been informed, however, upon good authority, of one instance in which coagulable lymph was found effused in the pelvis of the kidney.

When the disease does not prove fatal at once, the dropsical and other symptoms give way, either spontaneously, or under the treatment to be hereafter described. But there is much reason for thinking that, unless the overcharged system be speedily relieved, the germ of future and progressive disorganization of the kidneys may be sown. Febrile dropsy, and acute renal dropsy, may be considered, without much risk of error, as convertible terms.

DROPSY FOLLOWING SCARLET FEVER.

The dropsy which is apt to arise as a sequela of scarlet fever (and occasionally, but rarely, after measles) belongs to this class of febrile dropsies. It appears to have no relation, or, if any, an inverse relation, to the violence and danger of the preceding fever. It is much more common after a mild, than after a severe disease. This, in all probability, is owing to the circumstance, that less care and caution are observed in the milder cases, during the dangerous period of desquamation and convalescence ; a period more dangerous in that form of scarlatina, than any other. In the graver cases the convalescence is slower, more doubtful, and accidental or careless exposure to cold is more guarded against, or takes place later ; whereas, in the milder disease, the patients are apt to go out, while the new cuticle is still forming. In carefully tracing the histories of dropsy, succeeding to scarlet fever, it will almost always be found, that the fever had been trifling ; that the patient considered himself well, or nearly so, and had heedlessly encountered a cold or damp atmosphere, so soon as he felt himself strong enough to leave the sick chamber. Plenciz, who has written well on this subject, remarks, that those patients who have had great desquamation of the cuticle, are the most liable to the dropsy ; that it is

more frequent in winter than in summer, and in such as are early exposed
to the open air, after having passed through the fever, than in those who
remain longer at home.   When the desquamation is over, and the new surface
has become in some degree hardened, the peril is past.   According to the
observations of Dr. Wells, the dropsical symptoms commonly show themselves
on the twenty-second or twenty-third day after the commencement of the pre-
ceding fever.   They have been known to begin as early as the sixteenth, and as
late as the twenty-fifth day.   When no dropsy took place before the end of the
fourth week, Dr. Wells always ventured to state that it was no longer to be
dreaded.

The dropsy is seldom observed, except in children and young persons.   The
age of the oldest patient that Dr. Wells had known to be so affected, was
seventeen.   Of ten instances of the disease seen by Dr. Blackall, six occurred
in children not exceeding the age of ten, and two others in persons who were
respectively twelve and sixteen years old.

We cannot infer, from this, that the susceptibility of this dropsical condition
lessens as years increase.   The greater prevalence of this variety of dropsy in
early life has no direct relation to age as a predisposing cause ; any more than
the comparative infrequency, at the same period, of renal dropsy unconnected
with scarlatina.   The fact is explained by the accidental peculiarities of the
antecedent disease.   The contagion of scarlet fever is active and widely diffused.
Few children escape its agency.   Few are capable of taking the disorder a
second time.   It follows that scarlet fever is rare in adult life ; and as dropsy
succeeds that disease in a very limited number of instances only, dropsy arising
in connexion with scarlet fever must, at the adult age, be still more uncommon.
Yet it is not unknown.   One of Dr. Blackall's ten patients was thirty, another
forty-two years old.   Both of these were women.

In this variety also of febrile dropsy, the urine is very constantly troubled,
bloody, albuminous ; and it is an interesting fact, that the chronic form of renal
dropsy, manifesting itself at some distance of time, has been distinctly traced
back to its source in the acute anasarca, immediately consequent upon scarlet
fever.   The sequence has occurred, in all probability, much oftener than it has
been noticed.   There is scarcely room for doubting that the series of organic
changes in the kidney, described by Dr. Bright, do frequently date their origin
from an attack of febrile anasarca ; and in proportion as facts, accurately
observed, accumulate on this subject, the chain of connexion becomes more
clearly visible between acute febrile dropsy, dropsy succeeding scarlet fever,
and chronic renal dropsy.   It is evident indeed, that the two first of these
three are, in their character and exciting causes, identical, the only difference
between them consisting in the remarkable predisposition towards the second,
impressed upon the body by the preceding exanthema.   Both of them, again,
are in many instances initiative of the third.

It is natural therefore, to expect that in the variety of febrile dropsy now
under consideration, as well as in the variety previously described, inflamma-
tion should be common, and evidenced by its unequivocal effects.   And it is so.
But the dropsy, we are persuaded, has no essential connexion with common
inflammation of any part, unless the state of the kidney be of that kind.   We
have examined the body very carefully in fatal cases, and found the serous
cavities full of clear liquid, without a trace of redness or of any of the unmis-
takable products or events of inflammatory action.

The earliest threatenings of this formidable complaint demand attention.   It
is usually preceded, for a day or two longer, by languor and peevishness ; fre-
quently by nausea and vomiting, and a costive state of the bowels.   The pulse
in the outset has been found slow, and beating with irregular intervals ; but it
afterwards becomes frequent.   The urine at first is scanty, as well as altered in
appearance.   The face becomes pale and chuffy.   Sometimes, as the disease
proceeds, violent headache, dilatation of the pupils, convulsions, or palsy, denote
effusion within the head.   Much more frequently the pleuræ are the seat of

the internal dropsical accumulation, and dyspnœa is a prominent symptom. Ascites, to any considerable amount is rare.

Treatment of general dropsy. The first and chief remedy in acute and febrile dropsy is venesection. This is suggested by the existing fever—for allaying which, bloodletting is an approved expedient—as well as by the immediate physical cause of the dropsical effusion, namely, the plenitude of the blood-vessels, resulting from defective or suppressed excretion. And a still more satisfactory reason for the adoption of this measure is, that it has been found by experience to be efficacious, alleviating in a remarkable manner the uneasy feelings of the patient, and leading in many instances to a speedy diminution of the dropsy. In order to avert as far as possible the danger of permanent injury to the congested kidney, it will always be right to take blood from the loins by cupping. The same object will be indirectly promoted by applying warmth to the surface of the body, and by administering diaphoretic medicines. The patient may be put into a warm bath, and take frequent doses of the liquor ammoniæ acetatis, and of James's or Dover's powder.

In some cases, diarrhœa or dysentery attend the attack. When the bowels are undisturbed or costive, an active purge should be given at the outset. After its full operation, or if the motions are already frequent, slimy, or sanguinolent, calomel and opium, frequently administered, have often excellent effects in allaying the intestinal irritation, and restoring the disordered functions of the skin.

If the urine be very deficient in quantity, and stupor or convulsions come on, it will be proper to abstract blood by means of cupping-glasses from the neck or temples, as well as from the loins. Under these circumstances, the disease resembles, or becomes, the Ischuria renalis of authors. If the secretion from the kidneys can be restored, the present security of the patient is accomplished. Stimulant diuretics, in large doses, have been recommended for effecting this: such as a grain of the powder, or a drachm of the tincture of cantharides, frequently repeated. The propriety and safety of this plan of treatment are very doubtful; since, so far as we understand the mode of operation of these stimulating diuretics, they act by determining an increased quantity of blood to the kidney, which in these cases is already overcharged with blood. It is better, in our opinion, to abstain from diuretics altogether.

These measures, diligently put in force, are generally successful. The dropsy disappears, and the febrile disturbance subsides. But the qualities of the urine should be carefully noted for some length of time after convalescence seems established.

Prevention is at all times better, and often much more practicable also, than cure. It seems probable that by the observance of sufficient caution, the supervention of dropsy after scarlet fever might always be obviated: and the prudential expedients are simple and easy. The patient should confine himself to the house, and sedulously avoid all exposure to cold and wet, for a full month after the accession of the disorder in the milder cases, and still longer when the fever has been more severe, or more protracted.

In chronic general dropsy of a purely cardiac origin the kidneys, being sound, offer the most convenient and eligible channel for carrying off the accumulated water. Diuretics, therefore, which in the preceding form of the disease were objectionable, rank in this among the most important of our curative expedients. When they fail to act, or prove insufficient for the purpose sought, we may have recourse, the state of the bowels permitting, to drastic purgatives.

Diuretic medicines are notoriously of most uncertain operation; sometimes completely answering our wishes, oftener perhaps disappointing them altogether. When the urine is strongly acid, and deposits, on cooling, a sediment like brick-dust, it will be well to try, at first, the alkaline diuretics, and particularly the salts of potass. Nitre, added to the common saline draught, or a combination of the acetate and carbonate of potass : or the bitartrate in small doses : or the

liquor potassæ. The tincture of squills also has appeared, in the experience of the writer, to correct this super-acid and turbid condition of the urine, while it increased its quantity.

Digitalis sometimes promotes, in a remarkable degree, the flow of urine; and this, according to our judgment, is its most useful and manageable property. Small quantities of the tincture, or of the infusion, may be added to other formulæ. Or the powdered leaves may be combined in pills. But one of the best modes of exhibiting digitalis for this purpose is to give larger doses of the infusion, half an ounce, for example, in some cordial water, at intervals of four or six hours, till three doses have been taken in succession, and then to pause and note its effects; and to repeat the three doses or not, accordingly.

The spirit of nitrous æther, and the compound spirit of juniper, have both well-marked diuretic properties, and may with propriety be added to most of the liquid formulæ for augmenting the discharge of urine. And as vehicles for the more active or concentrated ingredients, those vegetable infusions or decoctions should be chosen which are reputed to possess similar virtues; such as the decoction of broom-tops, or of juniper berries, or of winter-green, or the infusion of buchu.

Squills, turpentine, the tincture of cantharides, are drugs of a more stimulant nature, more peculiarly adapted to cases in which there is no febrile disturbance, and the kidneys are obstinately inactive.

Sometimes a combination of diuretic drugs proves more efficacious than larger doses of any of the ingredients administered singly. The operation of some of these combinations is undoubtedly quickened and exalted, in many instances, by the addition of mercury. A fluid drachm of the officinal solution of the bichloride in each dose of a mixture, or small quantities of calomel or blue pill when the medicines are given in the solid form. A very useful pill of this kind, much recommended by the late Dr. Baillie, consists of five grains of the pilula hydrargyri combined with one grain of the dried powder of squills, and half a grain of the dried powder of digitalis, to be given twice or thrice a day. Dr. Baillie states that squills and digitalis are by themselves much less effectual than when combined with mercury.

In choosing purgative drugs to aid the effect of diuretics in carrying off the dropsical fluid, or to take the place of them when they fail to act, we select those which produce copious discharges of serous evacuations from the bowels.

A combination of jalap and cream of tartar has been long and deservedly esteemed for its excellent operation in this way. Gamboge is also a good cathartic. It may be given two or three times daily in grain or two grain doses, with a drachm of cream of tartar suspended in two ounces of peppermint water. Or half an ounce of cream of tarter, mixed in six ounces of peppermint water, may be administered in one dose, every morning. The croton oil and elaterium are still more powerful evacuants of serous liquid from the intestines. One or two drops of the former, and from a quarter of a grain to a grain of the latter, will be about a proper dose. It is astonishing how much relief to the feelings of the patient, and how great a diminution of the dropsical symptoms, are sometimes obtained by these violent cathartics. Patients will earnestly beg for a repetition of them, even when their operation is for the time attended with considerable pain or sickness and general distress.

In addition to these measures for the removal of the collected water, attention must be paid to the actual condition of the heart. If the dropsy has been the result of anæmia, or of general cachexy of the system, we must endeavour to strengthen the patient, and to repair his impoverished blood, by nutritious food, and tonic medicine, and especially by the administration of steel. Preparations of iron have also an exceedingly good effect, oftentimes, in those cases of organic disease of the heart which consist in dilatation and tenuity, and consequently weakness of its muscular parietes.

On the other hand, if there be violent palpitations of the heart, with a strong and heaving impulse, we may appease the excessive action and afford sensible comfort to the patient, by applying leeches, from time to time, to the precordia.

In the renal form of chronic general dropsy, whether pure or mixed, the treatment is less accurately ascertained, and partakes of the imperfect character which marks, as yet, nearly all the rest of our knowledge concerning the complaint.

Whenever (in renal dropsy) acute symptoms and febrile disturbance occur, much relief may be expected from the abstraction of blood. When drawn from a vein, it usually shows the buffy coat. The existence at the same time of pain in the loins would indicate the propriety of applying cupping-glasses to that part. Nevertheless, the impoverishing effect of the disease itself upon the blood, and the probable dependence of some of the more distressing and alarming symptoms upon the serous condition of the circulating fluid, as well as the increased facility with which the altered blood may transude outwards —these are circumstances which should induce a cautious practitioner to have recourse to this heroic remedy only when it is clearly demanded.

One definite object, in the renal as well as in the cardiac variety, is to remove the dropsical fluid, from which the danger and the suffering often chiefly proceed. But it is a more nice question, when the kidney is involved in the disease, how this is to be accomplished. Can we, with the same safety as in cardiac cases, employ diuretics ? It has been thought that we cannot. As the primary state of the kidney is often, if not always, one of congestion ; as there is reason to suspect at least that the morbid change in progress is of the nature of, or allied to, chronic inflammation ; it has been feared that direct diuretics, such as are calculated to cause, keep up, or augment congestion of the kidney, or to stimulate and irritate that organ, would be likely to accelerate the disorganising process of which it is already the seat.

Now, although these views are partly hypothetical, and certainly are not yet established by conclusive proof, it is better, when we can, to observe the caution they suggest. It is better to endeavour to empty the distended cavities, and to relieve the loaded cellular tissue through the bowels, or the skin. Sometimes, however, more often indeed than in cardiac dropsy, we have the untoward complication of irritable bowels, or habitual diarrhœa ; and then drastic cathartics are inadmissible. But when this complication is not present, they are eminently useful.

Great benefit is sometimes derived from measures that act powerfully or steadily upon the cutaneous transpiration, and especially from warm or hot-air baths. The hot-air bath is, in many respects, to be preferred to the common warm-water bath, and even to the vapour bath. Upon the principle of heterogeneous attraction, the escape of the liquid from the surface of the body will be more promoted by a dry heat, than by water artificially raised to a high temperature, or even by an atmosphere made moist as well as hot by vapour. The risk, moreover, of exposure to cold, and the inconvenience and hazard of fatigue, are much less; for the hot-air bath can be brought, with but little trouble or expense, to the patient as he lies in bed. No better apparatus for this appliance of hot air to the body has been devised than the *sudatorium*, described by the late Dr. Gower in one of his little tracts, entitled *Auxiliaries to Medicine*. It has been in use at the Middlesex Hospital since its introduction there by that physician ; and of its efficacy the writer has had abundant experience. But in renal dropsy he has seldom found the relief thus obtained to be of itself sufficient, or of more than temporary duration. Still it is an expedient that should never be neglected ; and, in pursuance of the same indication, diaphoretic medicines are to be diligently exhibited. Dr. Osborne states that when the renal disease had been uncomplicated with other organic mischief, he has always found the dropsy disappear, upon the re-establishing of the functions of the skin.

These measures failing, as they often will, and diarrhœa forbidding the use of drastic purgatives, or drastic purgatives and diaphoretics together proving insufficient, we must, even in renal dropsy, since the mere dropsy is both distressing and dangerous, choose the least of two evils; or, rather, we must incur the risk of one possible and contingent evil, for the chance of obtaining what, if obtained, is a certain and positive benefit; we must endeavour to remove the dropsical accumulation by means of diuretics, whether these accelerate the progress of the disease in the kidney or not.

Such diuretics therefore are, in the first instance, to be selected, as seem the least likely to stimulate the kidneys injuriously. Cream of tartar has been found to be one of the most certain and useful; digitalis also is esteemed safer, and therefore more proper for this purpose than many others : and the simultaneous administration of these two has perhaps the surest effect of all.

When diuretic medicines prove efficient, they are commonly of great service, by reducing the dropsical swellings. But they are apt to be very capricious and disappointing; and we have tried, in renal dropsy, every known form and combination of diuretic, without augmenting the secretion of urine. Sometimes, though a plentiful discharge takes place through the kidneys, no impression is made upon the dropsy.

It is yet an unsettled question whether mercury be advisable, or even admissible, in these cases. The current of opinion sets against it, perhaps too strongly. It has been observed that salivation is apt to be produced by a small quantity of this drug, and to be unusually troublesome and severe, without bringing any corresponding advantage. Dr. Farre holds that mercury has the property of rapidly destroying red blood; and if so, it is to be regarded rather as an ally, than an antagonist of this malady. On the other hand, some patients have appeared to recover altogether, after passing through such furious salivation. One of the reputed virtues of the mineral is, that it promotes interstitial absorption,—a property which the usual changed state of the kidney in renal dropsy would seem to render valuable.

When internal remedies prove ineffectual, and outward applications to procure sweating miss their aim, it becomes necessary to look to those mechanical expedients which (in either form of the disease) may often afford ease and prolong life, and which sometimes, perhaps, may achieve a cure.

The tense and stretched integuments occasionally give way, the cellular tissue sloughs, and from the breach thus made water wells copiously forth, and great relief ensues. Sometimes, though rarely, the whole of the accumulated fluid has so escaped, and the dropsy has not reappeared. The sore has healed, and the natural cure has been complete.

This spontaneous mode of draining off the liquid has been imitated by art. For the unwieldy legs become painful as well as cumbrous; the integuments threaten to inflame or mortify; and if we can diminish the tension by removing a portion of the included fluid, we avert or lessen this danger. Moreover the penis and scrotum become, in many cases, so anasarcous as to increase materially the distress of the patient. The scrotum enlarges to an enormous size, so as to prevent the approximation of the thighs, and to render it impossible for the patient to lie on either side. And the swollen integuments of the penis impede the comfortable excretion of the urine, which is spilled upon the thighs and tumid scrotum, and the surface on which it falls becomes erythematous and raw, to the grievous aggravation of the patient's sufferings.

Now seeing that vesications sometimes form upon the dropsical limbs, and give vent, in some degree, to the fluid, these have been imitated, and artificial blisters excited. But they are highly dangerous, leading often to gangrene of the surface thus inflamed. Not many years ago it was the custom to make incisions in the œdematous legs, by means of lancets; these gashes seldom healed again, but became at length sloughing sores, and not unfrequently hastened the dissolution of the patient.

A great improvement upon these expedients is the modern practice of acu-puncture, which consists in perforating the integuments here and there by a fine needle.

It is surprising how much fluid may be let out in this way, to the great alle-viation of those symptoms which result from its accumulation. The liquid trickles rapidly forth, and will soak sometimes through the bed, and form a pool on the floor of the chamber. In one case, attended by the writer, the limpid fluid which thus oozed from a puncture in the thigh was caught and collected in a glass, by means of a little gutter of oiled silk. It was found that 90 minims, or a fluid drachm and a half, escaped in a minute, which is at the rate of $11\frac{1}{4}$ ounces in an hour; and this drain went on for upwards of four hours.

The surface on which these punctures have been made, sometimes becomes red, erysipelas supervenes, which is difficult to arrest, and the patient sinks. In a certain proportion of these cases the same event would probably have occurred, even although no punctures had been made, from mere tension of the integuments, and the progress of the disease. When these appearances present themselves, the affected limb should be kept in the horizontal position, and strips of linen, wetted with a solution of Goulard, applied to the inflamed surface.

Under the old system of incisions, it was found (and reason would teach us to expect this) that there was more hazard of sloughing when they were made on the legs, than on the thighs. The risk is much less when needles are used. But the punctures are not to be made without attending to certain precautions. They should not be too near each other: an inch and a half, at least, should intervene between them. Neither should they be too numerous, nor too deep. The depth must depend upon the circumstances of the case, and especially upon the place of the punctures. The needle should not be pushed so deep as to penetrate or wound any fascia, for the danger of subsequent inflammation would thereby be increased.

The peritoneum may at the same time require to be emptied in the same mechanical way, by help of a trocar. This should not be done, however, be-fore the symptoms absolutely call for it, nor until all other means of dispersing the water have been tried in vain. The circumstances that warrant or de-mand the performance of the operation, the dangers that attend it, and means of obviating those dangers, must necessarily be treated of under the head of ASCITES, to which upon these points the reader is referred.

By whatever means we may succeed in getting rid of the dropsy, there will remain (except in the comparatively few cases that are unconnected with organic disease, and depend simply upon debility or anæmia) the necessity for guarding against its return, by remedial measures addressed to the faulty organs. We may sometimes keep the disease of these organs in check even when we cannot cure it.

In cardiac dropsies, besides the medicines already specified, undeviating temperance and regularity of life must be enjoined, and the patient must care-fully and always avoid all active motion or exertion of the body, and all strong emotions of the mind; whatever, in short, might tend to hurry the circulation. These cautions can scarcely be enforced without plainly showing the patient the danger he will incur by their neglect.

In the renal variety of the disease, in addition to the appropriate remedies heretofore enumerated, particular attention must be paid to the avoidance of all exposure to cold and vicissitudes of the weather, and to keeping the surface of the body warm. Such patients should constantly be clothed in flannel from head to foot. Residence in a warm climate may be strongly recom-mended to those who are able to choose their place of abode. Some benefit may also be hoped for from counter-irritation—blisters or issues to the loins.

The diet in the chronic forms of the disease should be nutritive, but unstimu-lating. M. Solon suggests that if, in the renal cases, urea be detected in the

blood, the patient should be restrained from too animalised a diet. Dr. Budd has had the same thought, and has put the test, in the Hospital-ship Dread-nought, the utility of withholding all articles of food that contain azote. We have found this restriction entirely useless in one case in which it was fairly enforced.

Much unnecessary penance used to be imposed upon dropsical persons by stinting their allowance of drink. It was natural to suppose that the accumulation would increase in proportion to the quantity of liquid swallowed; but experience has shown this opinion to be erroneous, and *crescit indulgens sibi dirus hydrops* has ceased to be more than a poetical doctrine. The patient may safely be allowed to exercise his own discretion in this respect. When the peritoneum is full, distress is apt to ensue upon the distension of the stomach by drinks, but this source of suffering is soon discovered and avoided. The patient is better able than his physician to judge which evil is the greatest,—the torment of unslaked thirst, or the discomfort that may be produced by its immoderate indulgence.

The causes of dropsy in general are very well known, but their mode of action is not always appreciated, partly because they often are very slow and insidious in their effect, and partly because they are rarely simple, two or three of them generally producing a combined action, instead of a single one being sufficient to give rise to the effusion. Hence, as is remarked in the text, the organic mischief often remains when the effect, that is, the drop-sical effusion, is entirely removed. The causes of dropsy may therefore be classed into two great divisions—the permanent and the temporary; one is little influenced by treatment, and the other is often perfectly amenable to it; or if not strictly under its influence, may be of so temporary a duration that it ceases to do harm, and the dropsical effusion once removed, does not again return. Hence acute dropsies which are produced by the latter set of causes are in general quite curable, and do not often return except a permanent lesion existed before the action of the acute cause and remained after it had entirely ceased; and if the causes of the acute dropsies are purely functional, they yield to treatment still more readily than if combined with a positive though acute and curable alteration of an organ.

The temporary causes of dropsy are inflammation, particularly of the heart and large vessels, and of the kidneys, and simple suppression of the functions of the skin. It is true that in the latter case there is often an error of diagnosis, and that the kidneys are actually disordered as well as the perspiration arrested; but there are instances in which there is no reason to believe that these organs are at all involved. These active causes of dropsy produce the acute or inflammatory cases, and generally require a directly antiphlogistic treatment, such as bleeding, smart purging, and the more debilitating diaphoretics.

If the inflammation of the lining membrane of the heart in acute endocarditis be the exciting cause of the effusion, the antiphlogistic measures must be more energetic than in any other case, for the condition of the blood is then decidedly of a fibrinous or inflammatory nature, and the formation of lymph takes place very rapidly; these cases, in fact, are in the simple form nothing but examples of endocarditis or aortitis, with the addition of a dropsical effusion, but in practice we find them not so frequent as those in which the organic disease of the heart has preceded the inflammation. In the same variety, the mercurial practice answers extremely well; that is, the calomel combined with squill and digitalis, producing a double action—one immediate, as a diuretic, and another which depends solely upon the calomel, and is purely antiphlogistic. As this variety of dropsy belongs to the simple inflammatory diseases, its treatment is definite, and the results of it are more certain than in any other variety.

In the dropsy dependent upon the acute disease of the kidney, the symptoms are on the whole inflammatory, but to a less degree than in the cardiac variety. The inflammation of the kidneys is evidently peculiar, and differs therefore from that of the heart in the variety just mentioned, in which there is nothing but the ordinary lesion. The function of the kid-neys is deeply altered, and this may be one cause of the rapid change in the characters of the blood which then takes place. This includes most cases of dropsy which follow the desqua-

mation of scarlatina, and in some cases it is complicated with the cardiac variety. There is little of importance to be added to the remarks in the text.

The chronic causes of dropsy are still more numerous than the acute, but are for the most part strongly connected with them; that is, the chronic alterations of an organ will produce dropsy like its acute affections, and the former are sometimes a direct consequence of the latter; but this is not generally the case; the slow lesions producing dropsy commonly arise from alterations of nutrition and not directly from inflammation, and their very existence is often unsuspected until the effusion takes place. This may occur gradually, and as a direct consequence of the lesion as soon as the blood becomes thin and watery, or it follows the supervention of one of the acute causes of dropsy upon the chronic lesion. The mode in which the thinness of the blood favours dropsical effusions is intelligible enough—transudation takes place more readily into the cellular tissue, and the blood approaches more and more nearly to a mere watery fluid, which does not possess the same intimate combination with the body as in the healthy state; and there is a constant tendency to throw off the superfluous and abundant serum. The dropsy takes place in this way at the close of protracted diseases, in which the patient is gradually exhausted, and for the most part it is altogether incurable, and is regarded as a sign of the breaking up of the constitution rather than a positive disease, or even a peculiar symptom of disease.

The mode in which a course of acute dropsy acts in determining the effusion in an individual who is subject of a chronic lesion, is clear enough, for the same results must take place more readily, from an acute cause which is superadded to a chronic one, than if it were quite uncomplicated. This is precisely the mode in which most cases of chronic dropsy terminate; the remote lesion is chronic, but the immediate exciting cause is acute, and may often be removed for the time; and in a few cases the cure is permanent, although the patient may remain in his state of chronic ill-health, or may recover from the original lesion.

The causes of chronic dropsy are obstructions to the circulation, or organic lesions, which act upon the composition of the blood, or as has been just stated, an impoverished condition of the blood itself; that is, the affections of the liver, heart, and kidneys, producing the peculiar varieties of dropsical effusions, of which a full account is given in the text. As these are all more immediately connected with the diseased condition which forms the first link in the chain of morbid phenomena, they might properly be considered as the disease, and the term dropsy would then find but little space in nosological arrangements. There are reasons, however, for retaining it, for the present at least, for the proper symptoms of the effusion impress a peculiar character upon the disease, and no inconvenience results from the term, if we bear in mind the original lesion. If the quantity of effused serum be small it is of little moment, and then the term dropsy becomes inapplicable; this is especially the case in effusions into the cavities of the thorax.   G.

CEREBRAL DROPSY, OR CHRONIC HYDROCEPHALUS.

Origin of the disease.—Its progress.—Examples.—Mode of treatment.

UNDER the generic name of Hydrocephalus are included two very different diseases. Acute hydrocephalus is an inflammation. Chronic hydrocephalus is a dropsy. Acute hydrocephalus is inflammation of the brain, or of its membranes, occurring in children. In adults the same disease is usually called phrenitis, or encephalitis. Sometimes it is, and sometimes it is not, attended with the effusion of water into the cavities and cells of the brain. The name, therefore, is obviously a bad one, for it specifies a condition which is not constant, and it does not express the true nature or essence of the disorder. It is, however, only with *dropsy* of the cranial cavity, or the chronic hydrocephalus of authors, that we are here concerned.

Chronic hydrocephalus is especially a disease of childhood. It almost always commences in early life. Very often it exists before birth. But the disease is not confined entirely to the first period of existence; for, though the greater number of those who are affected with dropsy of the brain either recover or die during their infancy, a few survive, bearing their complaint to the adult period, and even to old age.

Dr. David Monro relates the case of a hydrocephalic girl, six years of age, whose head measured two feet four inches in circumference. Gölis mentions a person afflicted with this disease, who lived to be twenty-seven years old; Aurivill another, who reached forty-five year; and the celebrated Gall speaks of one who attained his fifty-fourth year in the same condition. Many other instances of the same kind, and of still greater age, are on record. In most of the anatomical museums of this country a cast is to be seen of the enormous head of J. Cardinal, who died in Guy's Hospital in the year 1825, being then nearly thirty years old.

When the disease befalls the fœtus, and the cranium is enlarged, it presents an obstacle to the ready passage of the child into the world. Hence, the moment of birth proves, to many of these infants, the term of existence. *Nascentes moriuntur.* The pressure of the maternal pelvis is fatal; or the diseased head bursts, or is punctured to save the life of the mother: the contents of the crushed skull escape, and the empty shell collapsing passes through the natural outlets. But, in many cases, the dropsical cranium is expelled entire and unhurt, and the infant lives for a longer or shorter period. Many, again, are born apparently healthy; but soon, in a few days, or after some weeks or months, their heads are observed to enlarge with a rapidity quite disproportioned to the growth of the other parts of the body; and the enlargement is progressive.

What are the effects of this undue increase of bulk upon the outward form of the head? What are the precise conditions of the parts contained within the cranium? How do those conditions affect the three great functions of the brain, —sensation, thought, and voluntary motion? Have we any means of arresting or lessening the increase of size, or of curing the disease, or of preventing its occurrence? These are questions of great interest, which we shall proceed to consider.

The intervention of the membranous partitions, called fontanelles and open sutures, between the un-united bones of the skull, allows the pressure occasioned by the gradual accumulation of water within the cranium of the fœtus, or of the young child, to modify the external shape of the head. These membranous interspaces are unnaturally wide, and occur in parts where they are not found in healthy children of the same age. The process of ossification goes on as the surface to be thus made solid increases: but the bones are extremely thin. Little islands of the bone appear in seas of membrane. By degrees, if the child continues to live, the proportion of membrane to bone becomes less and less, and, at length, the whole braincase is hard, and firmly closed up, its surface exhibiting an unusual number of joinings; there are many *ossa triquetra*.

Meanwhile the direction and relations of the loose and yielding bones are altered. The os frontis projects, so that the forehead, instead of slanting a little back, rises perpendicularly, or even slopes outwards and overhangs the brow: the parietal bones bulge, above, towards the sides; the occiput is pushed back; and the head becomes long, and broad and deep, but flattened at the top. This is the most ordinary result. In some instances the skull rises upwards in a somewhat conical form, like a sugar-loaf. Not unfrequently the whole head is more evidently misshapen, the two sides being unsymmetrical. Some of these varieties of form are fixed and connate, and others are owing, probably, to the kind of external pressure to which the head has been subjected.

While the skull may be rapidly enlarging, the bones of the face grow no faster than usual, perhaps not even so fast: and the disproportion that results

gives a singular and peculiar expression to the unhappy beings who are the sub-jects of this calamity. They have not the usual round or oval face of childhood: the forehead is broad; and the outline of the features tapering towards the chin, gives a sort of triangular character to the visage. The great disproportion between the head and the face assists the diagnosis of the disease; and would serve to distinguish the skull of a hydrocephalic child from that of a giant.

When death allows us to explore the physical causes of these singular altera-tions in bulk and figure, we find that they commonly proceed from the pressure of accumulated water: the complaint is manifestly a dropsy. But the situation of the water, and the condition of the brain itself, are subject to some curious varieties.

In a certain number of cases the brain is incomplete: deficient in some of its parts, or even wanting altogether; that portion of the cranial cavity which should contain cerebral matter being filled up by a thin transparent liquid. From some unknown cause acting during the period of intra-uterine life, the progressive formation of the brain has been stopped. Marks of imperfect developement are often visible in other parts of the same infants; in the fissured palate, for instance, the cleft lip, or the bifid spine. It is in cases of this kind, generally, that the skull, unnaturally small perhaps, is pinched up into a conical peak, and has considerable thickness. They are evidently hopeless cases; although to the physiologist they are subjects of considerable interest, they have none for the practical physician.

But in the majority of instances, when the infants survive their birth, the liquid is contained in the cerebral cavities, or ventricles of the brain, which are expanded into one. The convulsions are unfolded, and the cerebral matter is spread out into a hollow sphere; the irregularities of the surface have disap-peared; the whole of the brain is smoothly stretched in a thin layer immme-diately beneath the bones and their connecting membranes, and surrounds the enclosed liquid like a bag. Less frequently a different state of matters is seen: the liquid, instead of being included within the cerebral substance, lies in contact with the dura mater; while the brain, perfect in all its most important parts, is at the bottom of the cavity. The difference, however, is more apparent than real: the two conditions are originally and essentially the same; only that, in the one case, the solid parts that lie around the ventricles gradually expand as the fluid slowly increases, much as an air-balloon expands in proportion as gas is introduced within it; while, in the other case, the seams or commissures (as they are technically called) that join the hemispheres of the brain together give way, are from the first deficient, and the ventricles and the general sac of the arachnoid come to form one huge cavity: the hemispheres are turned aside, or folded back, so that the surfaces naturally central look upwards, and form apparently the outer surface of the brain. Even this condition is not incom-patible with prolonged life, and the manifestation of intellectual phenomena.

For convenience of description, the liquid that constitutes dropsy has fre-quently been spoken of as *water*. Water forms, indeed, the main bulk of it, but as has been previously explained, the liquid is something more than mere water; like the serum of the blood, it contains certain saline ingredients, and a portion of animal matter. The liquid of hydrocephalus approaches more nearly to pure water than that of any other form of dropsy, containing a very small quantity only of animal matter or of salts. It does not coagulate when heated.

Some of the consequences of this distension of the brain and skull with watery fluid are simply mechanical. The large unwieldy head is too much for the muscles of the neck to sustain without fatigue, or even, when they are unassisted, to sustain at all. The child walks gingerly and carefully, like a person who poises a heavy load upon his head; or he holds and partly carries his head with his hands as one would study and support a pail; or he reclines the weight of his burden upon the chair or table, as he sits.

Far more important effects of the disease are the changes produced in the

immediate and principal functions of the brain. The child is soon found to be deaf, or blind, or palsied in one or more of its limbs, or idiotic, or all these: *i. e.*, the special senses, the power of voluntary motion, and the mental faculties are apt to be defective, or perverted. But in some of the individuals who, with excessively large heads, have yet numbered many years of existence, the intellect and the senses have remained, if not entire and perfect, yet still sufficiently effective to answer the common wants and purposes of social life. The moral emotions strong, the feelings lively and correct, the memory tolerably retentive, the reasoning powers respectable.

The child seen by Dr. Monro is described by him as being "as lively and sensible as most of her age," and as "having a strong memory." Dr. Bright records the following particulars, some of them very curious, of his patient, Cardinal. He was born in 1795. At the time of birth his head was only a little larger than natural, but it had a pulpy feel, as if it were almost destitute of bony matter. A fortnight afterwards it began to increase, rapidly, and when he was five years old, it was but little less, according to his mother's account, than when he died. He could not walk alone till he was nearly six, and then only on level ground, and if he attempted to run or stoop, he fell down. He was sent to school when he was about six, and soon learned to read well, and to write tolerably; but writing he soon gave up, because, as he was near-sighted, it obliged him to stoop, which he could not conveniently do. When a candle was held behind his head, or his head happened to be between the spectator and the sun, the cranium appeared semitransparent: and this was more or less the case till he was fourteen years old. About the age of twenty-three, epileptic fits began to show themselves; and after that, his health, which previously had been very good, began to fail a little. The ossification of the skull was not complete till two years before his death, the anterior fontanelle being the last part that closed. It has been mentioned that he was near-sighted, but he was very quick of hearing; his taste was perfect, and his digestion good. Dr. Bright states that his mental faculties were very fair, and his memory tolerable, but it was not retentive of dates. It is said that he was never known to dream. There was something childish and irritable in his manner, and he was easily provoked. He died at last of fever and diarrhœa. There were seven or eight pints of fluid within the cranium, in contact with the dura mater: at the base, or floor, of the skull, lay the brain, with its hemispheres opened outwards, like the leaves of a book.

How comes it that the cerebral functions are thus sometimes fulfilled, or go on so well, when the machinery through which the mental powers are manifested is so palpably and greatly deranged? How comes it that life, and especially the life of the mind, subsists at all? These questions open very interesting considerations. It would appear, from such cases as have been referred to, that the curious arrangement and collocation of the several parts of the brain is rather a matter of convenient package than of necessary relation. The pulp, which is the instrument of sense, and thought, and volition, is there, but it is disposed in an unusual shape. In neither of the two varieties that have been described as being compatible with prolonged existence, is there any necessary diminution of the cerebral mass. The brain itself, which forms a bag in the one case, and is split in halves in the other, has been found to weigh quite as much as a healthy brain at the same period of life. There has been no loss, therefore, of substance; the pressure has been gradual, and it has not acted injudiciously through counter-pressure: no countervailing resistance has been furnished by the rigidity of the brain-case, and thus the unopposed distending force neither causes absorption of the cerebral pulp, on the one hand, nor, on the other, induces coma, or convulsions, or idiotcy, by its compression. The change in relative position is, moreover, the least at the base of the brain, where the nerves emerge, and the great vascular trunks are situate.

Most commonly, however, the mental and voluntary functions are maimed, or perverted ; and these serious calamities make parents look at a large head, in a young child, with anxious solicitude. It is of some importance, therefore, that the practitioner who may be consulted in such cases should be aware that the head may be extravagantly large without dropsy of the brain, and without disease.

A mother brought her little boy just two years old to the late Dr. Sweatman, alarmed at the size of his head, which from the age of six months had been gradually increasing till it had become so large as, by its weight, to prevent the child from continuing long in the upright posture. The boy occasionally seemed uneasy, and then relieved himself by laying his head upon a chair. There was no other symptom of disease. He was active and healthy, though thin ; had never squinted, nor had any fit or convulsion ; nor was he subject to drowsiness or startings during sleep. His appetite was good, and all the animal functions properly performed. Dr. Sweatman asked Mr. Mayo to see the child with him in consultation. They both believed it to be a case of hydrocephalus, but agreed in thinking that in the absence of symptoms it would be wrong to risk disturbing his digestive organs by active medicines. Half a year afterwards the child died of inflammation within the thorax. The head, which had not undergone any further enlargement, was examined by Dr. Sweatman and Mr. Mayo. It measured from ear to ear, across the vertex, 12 inches ; from the superciliary ridges to the occipital, 13 inches ; and in circumference, 21 inches. The anterior fontanelle, which was quite flat, measured across its opposite angles $2\frac{1}{4}$ inches by $1\frac{1}{2}$: the posterior fontanelle was completely closed, as was the frontal suture. There was no absorption of bone at any part ; on the contrary, it was becoming thicker. The dura mater adhered with great firmness to the skull, and a layer of false membrane, as large as a crown-piece, was found adherent to it at its upper and anterior part. Beneath the arachnoid at that part there was slight gelatinous effusion. In all other respects the organ was natural. The convolutions were perfectly distinct, and retained their proper rounded form. All the ventricles were empty, and not dilated. The surface of the medullary matter, exposed by different sections, presented unusual vascularity. The brain when removed from the body weighed within half an ounce of three pounds avoirdupois, and might have been taken for that of an adult ; whereas the nerves arising from its base, and the medulla oblongata, were in size those of a child. (*Med. Gaz.*, vol. xv., p. 595.)

M. Scoutetten relates an example of the same kind which he observed in a child five years old. Its head was as large as that of a well-grown adult person. The skull was from a line and a half to two lines in thickness. The dura mater adhered firmly to the bone, and the cerebral mass exactly filled up the cranial cavity. The superior posterior part of the brain was developed beyond measure, so that to reach the ventricles it was necessary to make an incision nearly three inches in depth. There was nothing unusual to be remarked in the cerebral functions of this child : in respect of intellect, it was just like other children of the same age. It died of acute inflammation of the bowels.

These were cases of hypertrophy of the brain and skull ; and the lesson which such histories convey is this : we are not to conclude that every child having a very large head is a hydrocephalic child. So long as there are no symptoms, we are not to intermeddle with such children, nor to risk the ruin of their health by the *nimia cura medici ;* and we may comfort their parents with hope.

When (as sometimes happens) the brain is thus prematurely developed, but the capacity of the skull does not enlarge at the same rate, a peculiar and interesting form of disease arises ; to which the name of *Hypertrophy of the Brain*

has been assigned by the few authors who have noticed it. In these cases, the pressure to which the nervous pulp is subjected produces its ordinary consequences—epileptiform convulsions, coma, and at last death: and inspection of the encephalon shows that such pressure had operated; for the surface of the cerebrum is found dry and smooth, its convolutions flattened and forced so closely together that the sulci between them are almost obliterated, while the ventricles are even smaller and contain less fluid than is natural.

We have seen that while the brain itself is gradually unfolded or its hemispheres are parted and turned aside, by the liquid accumulating within the cranium, the functions of the organ may suffer but little, so long as the yielding brain-case permits the expansion or separation of the nervous substance, without inordinate pressure. But as soon as undue pressure begins to be exercised, then arise morbid symptoms, or the defects that have previously shown themselves are aggravated. Hence that period of life becomes perilous when the skull, by the closure of its fontanelles and sutures, loses its capability of expansion.

The sutures have even been known, after close union, to open again to a considerable extent, under the augmenting pressure: and they may firmly unite, while large portions of the walls of the skull remain membranous. (Baillie, *Trans. Coll. Phys.*, vol. iv.) A beautiful preparation showing this may be seen in the collection which belonged to the late Dr. Sweatman.

Indeed, although this complaint has been spoken of as being especially a disease of childhood, it does occasionally commence long after the sutures of the skull have been permanently closed. Enlargement of the head in these cases is impossible, but this circumstance, and the symptoms it is apt, mechanically, to produce, form the only differences between the disorder as it affects the child and the adult. In both cases the cerebral functions become disturbed, and at length, convulsions and coma close the scene. In both, a dropsical state of the ventricles of the brain constitutes, often, the only morbid change presented after death.

Treatment. Such, then, being a condensed account of this afflicting and formidable malady, can we ever accomplish its cure? Sometimes, experience tells us, we may: and at all times we must attempt it, for parents will cling to hope; and, in truth, there have been, under judicious management, a sufficient number of recoveries to forbid despair in any case, and to make it our duty carefully to employ those measures which have, occasionally, brought the disease to a favourable termination. Gölis even affirms, that of the cases which began after birth, and which he saw and treated early, he was fortunate enough to save the majority.

The cure may be attempted by internal remedies, or by external mechanical expedients, or by both.

The internal remedies by which most appears to have been effected, and from which therefore most is to be hoped, are diuretics, and purgatives, and, above all, mercury, which is believed by many to have a powerful influence in promoting absorption. Conjointly with these, the abstraction of small quantities of blood from the head by means of leeches has been found beneficial.

Gölis advises that calomel should be given in half-grain doses, twice a day; or, if that quantity should purge the patient too much, in doses consisting of only one-fourth of a grain. At the same time he would rub a scruple or two of mercurial ointment, mixed with ointment of juniper-berries, into the head, every night. He keeps the head constantly covered also by a woollen cap. Infants require, he says, no other nutriment than good breast milk, while older patients should take a moderate quantity of meat. In mild weather, they should live as much as possible in the open air. Under this plan of treatment, he asserts that he has known the circumference of the head decrease by half an inch, or an inch, in a period of six weeks, or three months; and that perseverance

in this method has frequently, in his experience, been followed by perfect recovery, both of the mental and of the bodily powers.

In an interesting case which occurred in a boy fourteen years of age, after cupping, blisters, the blue pill, drastic purgatives, and the ordinary diuretics had failed, the late Dr. Gower suggested a plan which he had himself found successful in some similar cases, and which had first been followed and recommended by Carmichael Smith, who has recorded ten instances of recovery under its adoption. This plan was to rub down ten grains of crude mercury with about a scruple of manna, and five grains of fresh squills; to administer this as one dose; and to repeat it every eight hours. This dose was taken by the patient, three times daily, for nearly three weeks, without causing ptyalism. Its effects were great reduction of strength and loss of flesh, with gradual relief of all the boy's sufferings. The medicine operated profusely by the kidneys. It was continued twice, and at length once only, a day, for another fortnight, when every symptom of the disease had disappeared. The boy was extremely emaciated; but beginning at that time to take an ounce and a half of Griffith's mixture thrice a day, he soon regained his flesh and strength, and got quite well. And he remained so eight years afterwards.

Bandaging the head is one of the mechanical expedients which have been tried, and found useful. The only cases to which it can be applicable are those with sutures yet unclosed. It seems to have been suggested by the notion that the increase of the fluid within, and probably some of the symptoms also, might depend, in part at least, upon the want of firmness and proper resistance in the outer containing parts, the feeble and flexible half-solid skull. A certain degree of support and pressure appears necessary to the due exercise of the cerebral functions. Beyond this degree all pressure is hurtful. In fact, the easy yielding of the bony walls of the head, by reason of the membranous spaces that exist in the early periods of life, proves the safety of these patients. If the skull did not expand as the water gathered, morbid symptoms would ensue. Hence, great nicety is required in the application of this remedy. When the head is palpably enlarging, compression by means of plasters or bandages would probably be mischievous. When the disease is stationary, and the unconnected bones of the skull are loose and fluctuating, and the child is pale and languid, much benefit may be expected from moderate and well-regulated support. Sir Gilbert Blane, it is believed, was the first to suggest this mode of treatment, but its safety and efficacy have been more recently demonstrated by Mr. Barnard of Wolcot, who has related instances in which bandaging was performed with complete success. In these cases the children were pale, bloated, and feeble, with flabby muscles; the bones of their heads were movable and floating, and the functions of the brain more or less impaired. Mr. Barnard applies strips of adhesive plaster, about three-quarters of an inch wide, completely round the head from before backwards; covering the forehead from the eyebrows to the hair of the head, as low down on the sides as the ears will permit, and lapping over each other behind;—then cross strips are carried from one side to the other over the crown of the head: and lastly, one long strip reaching from the forehead within half an inch of the root of the nose, over the vertex to the nape of the neck. In his first trial of this plan, but never afterwards, Mr. Barnard laid pieces of linen wetted with cold water over the plasters. Castor oil, to regulate the bowels, was the only medicine given. The effects, in all his cases, were a gradual diminution of the size of the head, mitigation and ultimate disappearance of all head-symptoms, such as strabismus, rolling of the eyes, starting of the muscles, convulsions, and at the same time increased tone of the muscular system, an improved appearance of the skin, and of the secretions from the bowels. These are striking results: they seem to show, that in certain conditions of chronic hydrocephalus, a part of the danger consists in the lack of due support and confinement of the brain; and they prove that compression alone may be equal to the cure.

But it is well known (as has been observed before) that in children who are not of this pale and feeble habit, and in whom ossification of the skull goes on, the period of danger is the period when the walls cease to yield, and the water continuing to accumulate, inordinate pressure arises. To such heads the application of bandages or plasters must of itself be insufficient and unsafe. The brain-case being no longer capable of expansion, there remains to be attempted a diminution of the liquid it contains.

Now, much diminution of the accumulated fluid, through the agency of absorption alone, is scarcely to be looked for : even although we endeavour to aid that process by applying leeches and cold water to the head, and by purgatives, diuretics, or diaphoretics. Some more sure and effectual mode of emptying the distended cavity has therefore been earnestly sought for ; and there is one very certain method by which it may be emptied, viz., by perforating with a trocar the membrane of the fontanelle, and the membranes of the brain, and even the expanded cerebral matter itself. He was, indeed a bold physician who first proposed thus to decant the water from the brain. But his boldness has been amply vindicated. It is not a very new suggestion, nor a new practice ; but it has received particular attention in this country of late years : and though tapping the brain in chronic hydrocephalus is denounced as useless and cruel by some high continental authorities, by Gölis and Richter especially, it offers one of the best among the few chances of safety to the patient ; of ultimate safety, namely, for the operation is of course attended with the present risk of accelerating the child's death. Other measures, however, failing, we are warranted in recommending that risk. We must consider that, by performing the operation, we incur the hazard of abbreviating the existence of a being whose life could scarcely have been long continued, or capable of enjoyment : but then we afford some chance of a perfect cure. A speedy death, an uncertain life with *bodily* and *mental* imbecility, or complete restoration, are the three events to be contemplated. Of the three, the second is incomparably the most wretched ; and probably few parents, having to decide the painful question in reference to their own child, would hesitate to accept the alternative of probably speedy death, on the one hand ; possible complete recovery, on the other.

But, to say the truth, the immediate danger is not so very great as might have been supposed ; provided that the operation be cautiously and skilfully performed, and only a moderate quantity of water be drawn off at a time. That even a very rough operation is not necessarily fatal, we learn from a singular case related by Mr. Greatwood. A child, fifteen months old, and afflicted with chronic hydrocephalus, fell down and struck the back part of its head against a nail, which penetrated the skull. Above three pints of water gradually flowed out at the puncture thus made, and the child was cured.

There is an account of the performance of this operation by Lecat, in the *Philosophical Transactions* for the year 1751. In 1778, Dr. Remmett of Plymouth punctured the head of a hydrocephalic child, on five several occasions, with a lancet, and took away, in all, no less than eighty ounces of fluid. The child died seventeen days after the last tapping. (*Med. Com.*, vol. vi.) A very interesting case of the same kind is related by Dr. Vose of Liverpool. (*Med. Chir. Trans.*, vol. ix.) His patient was an infant seven months old. Its head was more than twice the ordinary size. Three operations were performed, the first with a couching needle. Upwards of three ounces were evacuated, and it was estimated that about the same quantity dribled away afterwards. Thereupon the child became very weak, but was presently revived by some cordial medicine. About six weeks afterwards, the liquid having collected again, an opening was made with a bistoury, and eight ounces were removed ; and nine days after that, twelve ounces more, without any bad consequences. The head diminished in size, the patient got apparently well, and the case was published as a successful one. Unfortunately, however, the complaint afterwards returned, and the child died of it.

Mr. Lizars of Edinburgh operated upon a little patient of his twenty times in the course of three months, using a small trocar. He observed, that upon letting out the water, squinting and dilatation of the pupil, which had previously existed, ceased *immediately*. The child recovered. (*Edin. Med. and Surg. Journ.*, April, 1821.)

Another striking and instructive instance is recorded by Mr. Russel of Edinburgh. The patient was an infant three months old, with an enormous head (twenty-three inches in circumference and fifteen and a half inches from one ear to the other). The child was affected with strabismus, and a perpetual rolling of the eyes. The usual routine measures, compression among others, had been employed without any success. By four operations performed at intervals of about ten days, the size of the head was considerably diminished : but the fluid continuing to collect, calomel was given in frequent small doses, and the gums became sore, and the child got well. At eight months old the dimensions of the head were less (by four inches in circumference, and by two and a half inches across the vertex) than they had been previously to the first tapping ; and the sutures had entirely closed. (*Edin. Med. and Surg. Journ.*, July, 1832.)

Dr. Conquest has, more than any other person, given authority to this operation. In a paper published in March, 1838, he tells us that he had then tapped the heads of nineteen children for this complaint, and in ten of the nineteen cases the children survived. He introduces a small trocar through the coronal suture below the anterior fontanelle, and cautiously makes pressure upon the head afterwards by means of strips of adhesive plaster, and he closes the wound of the integuments carefully after each time of puncturing. The greatest quantity of liquid withdrawn by him at any one time has been twenty ounces and a half, and the greatest number of operations on any one child has been five, performed at intervals varying from two to six weeks. The largest total quantity of water removed was fifty-seven or fifty-eight ounces, by five successive operations.

This expedient then, though doubtless hazardous, is really a most valuable one. The rules for its performance may be stated in a few words. The operation should scarcely be attempted until other means have failed. The trocar should be small, and it should be introduced perpendicularly to the surface, at the edge of the anterior fontanelle, so as to be as much as possible out of the way of the longitudinal sinus, and of the great veins that empty themselves therein. The fluid should be allowed to issue slowly, and a part only of it should be evacuated at once. The canula should be withdrawn, and the aperture in the skull closed, as soon as the pulse becomes weak, or the dilated pupil contracts, or the expression of the child's face manifestly alters. Gentle compression should be carefully made to compensate, in part at least, the pressure that has been removed with the fluid. Should the infant become pale and faint, it must be placed in the horizontal posture, and a few drops of sal volatile, or of brandy mixed with water, should be given. Sometimes a slight degree of inflammatory action comes on in the course of a day or two after the tapping. When this happens, the remedies of inflammation, and especially leeches and cold applications to the head, must be adopted without delay.

We have twice witnessed this operation. On the first occasion it was performed at our request by a surgeon, upon the infant of a poor woman, after the other measures before spoken of had been tried in vain. To the horror of all who looked on, when the trocar was withdrawn from the canula, instead of transparent serosity, a fine stream of purple blood spouted forth. The opening was at a considerable distance from the longitudinal sinus ; but the instrument was not so delicate as it might have been, and one of the larger superficial veins had probably been pierced. Neither was the trocar introduced in a sufficiently perpendicular direction. The chance of striking a vein is obviously increased, and a larger portion of the cerebral mass is also wounded, when the instrument is carried obliquely inwards. The child presently became deadly

pale and faint, and its immediate dissolution was naturally expected. Under
the use of stimulants, however, it revived again; no hæmorrhage took place
internally; and after a day or two it was evidently much the better for the loss
of blood. But this amendment did not last: and the mother, who had been
terrified at the direct result of the operation, feared to present her infant again,
lest it should be repeated. At length the child died, but no opportunity of
examining the interior of the head was allowed.

The other instance was that of an infant about eight months old. Four
months after its birth, its head was observed to grow inordinately large. At
the time of the operation the fontanelles were exceedingly tense; the child
screamed frequently, occasionally vomited, and was slightly convulsed; the
features were pinched, and the eyeballs distorted downwards, without any
dilatation of the pupils. Four ounces of clear liquid were evacuated through
the anterior fontanelle. A few hours afterwards, the distortion of the eyeballs
had disappeared; the child was tranquil, and much improved in aspect. Three
ounces more were taken away the next day. For two days subsequently, the
symptoms appeared to be all mitigated; but the skull was flaccid, yielding to
the gentlest pressure. On the evening of the fourth day after the first tapping,
the respiration became hurried, the child grew dull, and before midnight expired.
In this case it appeared to us, that the chance of success was baulked by the
want of external support subsequently to the tapping.

Any comparison between the merits of compression and of paracentesis, as
substantive remedies, seems idle. They are adapted to different and even oppo-
site conditions of the brain. The one supplies defect of pressure, the other
relieves its excess. It is clear that to hold the balance even, requires great
care, an accurate judgment, and incessant vigilance. Either expedient may
suffice, alone. Both may be (and have been) profitably employed in the
same case, according to its varying circumstances. If the head be tense and
firm, the trocar should precede the bandage; if lax and moveable, compres-
sion should be cautiously made, and followed, if necessary, by the puncture.

THORACIC DROPSY.

Symptomatic of disease of the heart or great vessels.—Rare as a substantial disease.—Physi-
cal signs and treatment.—Hydropericardium.—Symptoms and treatment.

DESCENDING from the head to the thorax, we have not much to say respecting
local dropsies of that region of the body. Hydrothorax, or water in the chest,
was a great bugbear to physicians before the time of Laennec. The symptoms
which were then believed to indicate that kind of dropsy—dyspnœa, increased
by the recumbent position, paleness or livor of the face, sudden startings from
sleep in alarm and with palpitation, œdema of the legs, and scanty urine;—
these symptoms, significant as they are of danger, are now known to denote
disease of the heart and great blood-vessels, rather than a passive accumulation
of water in the pleura. Auscultation teaches us that in many cases where such
symptoms present themselves, the lung fills up the space which is natural to it
in the thoracic cavity. The liquid found in the pleura after death is often
poured forth, there is reason to believe, during the last days or hours of sinking
life. Certainly hydrothorax, independent of inflammation, is rare as a substan-
tial disease. The signs that truly reveal the presence of liquid in the pleural
cavities, are purely auscultatory. When the quantity of liquid is moderate, the
lowermost part of the cavity is dull to percussion; the place of the dulness
varying as the posture of the patient is changed. Wherever this dulness exists,

the natural murmur of respiration is proportionally faint or extinct: and if the patient be in the erect position, his voice, as it reaches the ear of an observer applied near the scapula, assumes that peculiarity of tone and character, to which the term ægophony has been given.

Liquid may collect to this moderate amount in both of the pleuræ at the same time.

When the pleural sac is full and distended, the physical signs that it is so are very remarkable. Because that side of the thorax is permanently expanded, it partakes but little, or not at all, in the visible movements of breathing; the ribs are separated as after a deep inspiration; the intercostal depressions effaced; the sound produced by percussion is every where dull; the mediastinum and the heart are pressed towards the opposite side; no vesicular respiration can be heard; the vibratory thrill, conveyed in most cases to the hand in contact with a healthy chest, while the person is speaking, is now lost; the patient lies, with few exceptions, and for obvious reasons, on the distended side.

This condition cannot exist on both sides of the thorax at once, for it implies the complete suspension of the functions of the lung. It is never reached in simple hydrothorax. It is not an uncommon consequence of inflammatory effusion, or of hæmorrhage into the cavity.

When hydrothorax constitutes a part of general dropsy, its treatment merges in that of the whole malady. If the water can be removed from other parts of the body, it will commonly diminish in the chest also. Seldom, perhaps never, can we be justified in proposing paracentesis thoracis for the relief of *idiopathic* hydrothorax. There are cases in which that operation proves the salvation of the patient, but they depend chiefly on inflammation, and do not belong to our subject. The writer may refer to a clinical lecture printed in the *Medical Gazette*, vol. xxi., for a condensed statement of his thoughts respecting the operation in such cases.

Hydropericardium, as a species of local dropsy, independent of inflammation, is also rare. Like hydrothorax, however, but less frequently, it may form a component part of general dropsy. When present, it is not easy of recognition. The most certain sign (which requires indeed for its appreciation some space of time and repeated observation) is a varying in the extent of surface over which percussion of the pericardial region produces a dull sound. When with this phenomenon there are conjoined the more equivocal symptoms that belong generally to disease of the heart, shortness of breath, blueness of the cheeks and lips, a feeble and irregular pulse; and when especially the patient dares not lie down from a dread of suffocation, but remains fixed in one, usually the sitting position, with his head bending forwards;—we have reason to believe that the bag of the pericardium is distended by several ounces at least of water. In this case, also, the remedy of the hydropericardium is to be sought in the remedies of the general dropsy. If any thing special be indicated, it is the application of a large blister to the præcordia. The project of tapping the pericardium has been broached, nay, the operation has actually been performed: but it is difficult to conceive a cause in which so desperate a measure would be justifiable.

Hydrothorax is sometimes difficult to recognise, because it is in most cases a direct consequence of cardiac disease, and the symptoms of one pass insensibly into the other. It may be known either from the occurrence of dropsical effusions in other parts of the body simultaneously with the increase of the oppression and other pectoral symptoms. When dropsy of the chest supervenes, the disease of the heart is either far advanced, or the effusion follows acute internal inflammation, or endocarditis. In the latter case it generally yields readily to treatment, in the former it is incurable in the large majority of cases, or if it be removed, the relief of the patient is but temporary.

The term hydrothorax is now but little used, and the importance attached to the dropsy of the chest is now much less than formerly, because the effusion is regarded more as an appendage to the diseases of the heart than as a disorder meriting a distinct name. G.

ABDOMINAL DROPSY.

Restriction of the term ascites.—Mode of distinguishing ascites from ovarian and other forms
of encysted abdominal dropsy.—Exciting causes.—Treatment.

DROPSY of the peritoneum is frequently an incident only of general dropsy.   In
many instances, however, it is local, and uncombined with any morbid collec-
tion of liquid elsewhere.   To this species of dropsy the term *ascites* should be
restricted.   In either case the distension of the great serous membrane of the
abdomen is apt to become extreme.

In women there occurs a form of dropsy belonging also to the abdomen, but
not constituting ascites, which results from disease in one or both of the ovaries.
The points of similitude, comparison, and contrast, between this kind of encysted
dropsy and true ascites are so important, and so continually arising in practice,
that, foregoing strict system for the sake of utility, we propose to consider the
two disorders together.

Ascites, then, signifies the accumulation of serous liquid in the bag of the
peritoneum.   *Ovarian dropsy* consists in the collection of fluid in one (or more)
of the Gräafian vesicles of the ovary, or in a serous cyst connected with the
uterine appendages.   It is always desirable, though to an inexperienced practi-
tioner not always easy, to discriminate between these different diseases.

One source of distinction between them is furnished by the condition of the
abdomen during their early stages.

In ascites the progressive enlargement of the abdomen is uniform, as respects
the two sides of the body. The patient being supine, the weight of the augment-
ing fluid causes the sides of the abdomen, the flanks, to bulge outwards, or
swag over. This increased breadth of the trunk of the body is not observable in
the case of an ovarian tumour.   This circumstance forms also one of the dis-
tinctions (sometimes of great consequence to ascertain) between pregnancy and
ascites.

When we can trace the early history of ovarian dropsy, we find in most in-
stances that the abdominal tumour was first perceptible on one side, in one or
the other of the iliac fossæ, or somewhere between the ribs and the ileum.   But
when the distension of the abdomen is great, the distinction between ascites and
ovarian dropsy, drawn from the shape of the swelling, often ceases.

Examination of the abdomen, by pressure, will sometimes suffice to inform
us that liquid is contained in the peritoneum.   If sudden pressure be made with
the points of the fingers, in a direction perpendicular to the surface, a sensation
is often perceived by the examiner, which it is difficult to describe in words, yet
which is quite decisive, and not to be mistaken ; a sensation of the displace-
ment of fluid, and of the impinging of the fingers upon some solid substance
beneath. By this manœuvre may frequently be detected, not merely the pre-
sence of the liquid, but an enlarged liver or spleen, an ovarian or other tumour,
even when simple palpitation, in the ordinary way, will not allow us to ascer-
tain or trace the outline of these enlargements.

Sometimes, again, we satisfy ourselves, by handling the abdomen, that there
is a definite tumour in the situation of the ovary, the liver, or the spleen.

Percussion of the abdomen is fertile of information in these cases.

First, by the sense of fluctuation which it causes, when liquid is collected
within.

In copious ascites, if the left hand be laid flat against one side of the tumid
abdomen, and a slight blow be struck with the fingers of the right upon the
opposite side, the impulse is conveyed by a wave of the liquid to the open flat
hand, which feels a little shock that is perfectly distinctive. The larger the

amount of accumulated liquid, and the thinner and tighter the walls within which it is confined, the more sensible and decided is this fluctuation.

When the peritoneum contains but a small quantity of liquid, fluctuation may often be satisfactorily made out, by percussing with one finger the most depending part of the cavity, while pressure is made with another finger very near the part struck. By a similar test the presence of fluid in a small cyst may sometimes be ascertained.

An ovarian cyst may be so large as to fill up and distend the peritoneum; and in such a case the sense of fluctuation is sometimes as delicate and perfect as ever it is known to be in ascites.

Mere fluctuation, therefore, is not a discriminating symptom between ascites and ovarian dropsy.

But secondly, percussion is full of instruction in the *sounds* it elicits. The sense of hearing will generally supply what the tact, or the sense of touch, is not always equal to.

In true ascites the relative place of the liquid and of the intestines is determined by the posture of the patient. The bowels, which always contain some gas, float to the upper part of the liquid, and there give out, when the finger, as a pleximeter, is applied to the corresponding surface and struck, their peculiar resonance. Mediate percussion will thus follow the gravitating liquid, and discover always a dull sound in the lowermost, and a hollow sound in the uppermost part of the abdomen.

But it is not so in ovarian dropsy. The cyst, in a diseased and enlarging ovary, rises in front of the intestines, and presses them back towards the spine. Hence, if there be any resonance produced by percussion, it is in one or the other, or in both of the flanks; and the umbilical region yields a dull sound, whatever the position of the patient may be. The same is true of the enlarging womb in pregnancy.

This mode of distinguishing between large ovarian dropsy and extensive ascites is practically of great value; and its usefulness is but slightly affected by its being liable to occasional, but rare, sources of fallacy.

1. The distension in true ascites may be so great, that the mesentery shall not be broad enough to allow the buoyant intestines to reach the surface when the patient is supine. This impediment to the efficacy of the proposed test the writer has met with in practice. A woman came under his care in the Middlesex Hospital with ascites. Fluctuation of the belly was unequivocal. While she lay on her back, the umbilical and epigastric regions were resonant when percussed, the flanks were dull: when she turned upon either side, the other side, previously dull, gave the hollow sound; the umbilical and epigastric regions, previously resonant, gave the dull flat sound. Under the treatment employed, the accumulated liquid was removed, and the patient left the hospital.

Some time afterwards, in going through the wards, the writer recognised her among the patients recently admitted by his colleague Dr. Hawkins. The ascites had returned, and the abdomen was enormously enlarged, and projected upwards, as she lay on her back, to an excessive height. The writer found fluctuation to be very distinct as before; but every part of the belly yielded a dull sound when struck by the fingers. At length this patient died, and it was seen after death, that there was nothing to prevent the rising of the intestines : they had floated, at the utmost tether of the mesentery, as high as they could, without reaching the surface of the prominent belly.

2. Another occasional source of fallacy has just been hinted at. The intestines may be tied down, and so prevented from ascending, by their specific lightness, to the upper part of the surrounding liquid; and this may happen, either in consequence of the adhesion of the various coils and hanks of the intestines to each other and to the parts behind them, which is not an uncommon occurrence; or they may, though unadherent, be swathed, as it were, and bandaged down, by a thickened and diseased omentum. This also the writer has known

to take place.   A man died under his observation, having had manifest ascites ; yet his whole abdomen, though not so much distended as to hinder the intestines, had they been free to rise, from reaching its walls, sounded dull on percussion.   Inspection of the body explained this circumstance.   When the peritoneum was opened, by an incision carried through the forepart of the abdomen, a quantity of serous liquor flowed out.   The floor of the cavity it had occupied was smooth and level ; and was found, on further examination, to be formed by a thick cake of omentum, strapped tightly over the subjacent intestines.   Of course the same diseased condition may occur in the female.

3. On the other hand, we have once known an ovarian cyst to exist where the umbilical region was tympanitic under percussion.   The case furnished just that kind of exception which serves to prove a rule.   A woman became our patient in the hospital, whose history was that of ovarian dropsy.   Some time previously she had discovered a small tumour in one of the iliac regions.   It increased, without much disturbance of her general health, until it became very inconvenient from its bulk.   She was then tapped, in one of the Borough Hospitals, and she stated distinctly that it was not a clear watery fluid that was evacuated, but a glutinous, mixed, and grumous matter, such as belongs to ovarian disease.   No doubt could be entertained that the enlargement of the abdomen resulted from disease of that kind, yet the umbilical region, when percussed, always rendered a hollow sound.   Upon the death of the patient the mystery was solved.   Air hissed out from the opening made by the scalpel through the abdominal parietes ; and the source of it being traced, an ovarian cyst, of considerable magnitude, was found adhering to the peritoneum in front of the belly, and containing no liquid, but some yellowish shreds only, the remains, apparently, of some smaller included cysts.   This ovarian bag had been filled with air, and had given occasion to the equivocal sounds.

These sources of possible mistake or obscurity very seldom exist ; and the physical diagnosis, as it has now been pointed out, is very certain and valuable. So completely physical are the tests, that they are as sure and instructive when applied to the dead, as to the living body.

Other points of distinction may frequently be derived from the history and progress of the two disorders.

The equable enlargement of the abdomen, on both sides, in ascites, and its unequal prominence on one side, in ovarian disease, have already been remarked upon.

Again, it is observable that, in true ascites, there are almost always manifest indications of constitutional suffering and disturbance,—a sallow complexion, debility, emaciation.   The morbid accumulation results (as will presently appear) from disease in some organ, of which the functions cannot be deranged without injury to the whole system.

On the other hand ovarian dropsy may last long, and be extreme in degree, while the general health is scarcely affected.   The mere bulk and weight of the swelling cause much discomfort and inconvenience, but in other respects the patient often remains in good health.   This appears to be owing to the fact that the ovary is not directly necessary to the life or well-being of the individual, but is merely subservient, for a limited time, to the purpose of reproduction. Among the symptoms that are common to ascites and ovarian dropsy, in their advanced stages, are those which are produced by weight and pressure ; such as shortness of breath, from the resistance opposed to the descent of the diaphragm ; anasarca of the legs and thighs, from pressure upon the inferior cava and its branches ; a peculiarity of gait, like that of a woman large with child, and depending upon the same cause, the necessity, of throwing the head and shoulders backwards to balance the weight of the distended abdomen in front.

It is not superfluous to caution the young practitioner against mistaking a distended bladder for dropsy of the abdomen.   An old Frenchman, brought into the Middlesex Hospital, was said by his friends to be afflicted with dropsy, and

to have been treated for that complaint. The abdomen was large, and dull under percussion, from the pubes to above the umbilicus. In the hypogastric region an obscure sense of fluctuation was detected. There was however, a strong smell of urine about the patient. Being interrogated, he said that he had formerly had some stoppage, but that he now passed plenty of water, and that it even ran from him. It was obvious that his bladder was enormously distended, unable to contract upon its contents, and overflowing. With some difficulty a catheter was introduced, and a large quantity of turbid and offensive urine was drawn off. The patient sank at length, and the bladder was found to be much diseased. The writer has known similar mistakes occur in private practice : nay, we learn, on the authority of Sir E. Home, the warning and instructive fact, that John Hunter once actually tapped such a bladder, in the belief that the disorder was ascites.

But encysted dropsy in the abdomen is not always ovarian dropsy.

Omental dropsy is described : the omental cavity alone being unfolded and distended with liquid. This the writer never has seen. Cysts containing a considerable quantity of a clear liquid, and connected with the liver, are common. Probably these are, in all cases (they certainly are in many), the effects of the growth of hydatids. Dropsy of the Fallopian tubes, dropsy of the uterus, large serous cysts in the kidney, constitute other forms of abdominal encysted dropsy. Such states must be discovered by their own particular circumstances. None of them are very common.

Ascites is sometimes the product of inflammation of the peritoneum, but the inflammation having ceased, no trace of it is discoverable in the actual condition of the living patient. The absorbing functions of the membrane having however been spoiled, the collected liquid remains. The writer believes that he has witnessed an instance of this. The history of sudden and sharp pain and tenderness in the abdomen, with fever immediately previous to the dropsical swelling, made it probable that it was the consequence of inflammatory effusion. But the fever had entirely subsided, no tenderness remained, and the general health was good. The patient had no other dropsy.

The main exciting cause however of true and uncombined ascites, is some obstruction to the free passage of the blood through the system of the vena portæ, and, as even prior to experience we might suppose, such obstruction arises more often from disease of the liver than from any other cause.

But disease of the liver is of very common occurrence, and oftentimes very obvious, while there is no ascites. Here, therefore, as in the case of cardiac and renal dropsy before, this question arises, with what kinds of disease of the liver is hepatic ascites most apt to be associated ? And here also, as before, we find that there is one special form of liver disease, which, though not the sole, is the grand cause of passive and simple ascites.

It has long been noticed, that mere enlargement of the liver is not the most common accompaniment of hepatic ascites ; but rather the small, hard, contracted viscus. Mere increase in the size of the organ may interfere but little with the portal circulation ; whereas a shrinking and diminution of its bulk must needs do so. In point of fact that particular condition of the liver, which the French have termed cirrhose, and which is familiar to morbid anatomists in this country as the *hob-nail* liver, is the great source of passive ascites.

The true nature of this remarkable disease of the liver is of modern discovery. The credit of correcting the erroneous opinions which had been entertained respecting it, is due, as the writer believes, to Mr. Kiernan. The change which the organ undergoes has also been clearly explained by Dr. Carswell : it results from chronic inflammation, and chronic thickening, miscalled hypertrophy, of Glisson's capsule. Since Mr. Kiernan's admirable exposition of the true anatomy of the liver has been given to the world, few can be ignorant that the cellular tissue, termed the Capsule of Glisson, accompanies and forms a sheath around the portal vein, the hepatic artery, and the

billary ducts in their course through the liver; while the hepatic vein and its branches are lodged in its substance, without any such investing membrane. It follows that a general thickening of this tissue produces a general pressure upon the portal veins, and impedes the return of the venous blood from the intestines. Hence, as in analogous cases, congestion of the capillaries, arrested absorption, mechanical transudation of the serous fluid. The pressure affects also the nutrient vessel, the artery of the liver; so that, in the majority of cases, there is atrophy and shrinking of the viscus; and sometimes, but not always, from pressure upon the biliary vessels, there is jaundice also. By degrees the cellular tissue itself undergoes the process of shrinking, and the linear spaces in which it ramifies on the surface of the liver are pulled inwards; the lobules appear to be prominent; and the surface becomes irregular, knobby, and studded with little roundish elevations, like the heads of nails. The constricted lobules are very conspicuous also in the cut surface of the organ.

In the living body the existence of this hepatic disease is, for the most part, a matter of inference only. It is rendered probable by its ascertained frequency in connexion with ascites, and by the absence of any other obvious cause for the dropsy. But sometimes the irregular surface may be felt through the parietes of the abdomen.

The nature of this morbid change affords a reason for the intractable and uncompromising character of ascites in general. The obstructed blood seeks, indeed, new channels, but the compensation they afford is rarely sufficient. The superficial veins become obvious, numerous, large, and wander with many inosculations over the surface of the belly. Large veins, significant of the same compensating effort, have been met with also in the adhesions which previous inflammation had left between the peritoneal surface of the liver and the walls of the abdomen.

Among the causes to which the thickening of the capsule of Glisson may be ascribed, habitual intemperance is probably much the most common. But this condition of Glisson's capsule, though the chief and by far the most frequent, is not the only cause of obstruction to the current of blood in the portal vessels, and of consequent ascites. In those specific forms of liver-disease, in which tumours are scattered through its substance, one of these tumours may be so situated as to press upon the trunk of the vein : so, obviously, may abdominal tumours of any kind, enlarged mesenteric glands, cancer of the pylorus, cancer of the head of the pancreas, and the like.

Ascites is found to be not unfrequently associated with the disease or enlargement of the spleen also; but in most instances of this kind, the enlargement of the spleen, and the peritoneal dropsy, are not connected as cause and effect, but are both consequences of portal obstruction.

When, after death preceded by ascites, the cavity of the abdomen is examined, its contents present a bleached and sodden appearance. It has been made a question, whether this be the result of the long-continued immersion of the living tissues in the accumulated water, or of their short maceration after death. The question has no practical importance.

The anatomical characters of ovarian dropsy have been already fully treated of. (See DROPSY OF THE OVARY.)

Treatment. Of both forms of abdominal dropsy it may be said, that a cure is seldom accomplished; yet ascites has, upon the whole, a more certain progress towards the destruction of life than ovarian disease, while perhaps it is oftener cured.

In passive ascites, where the distension of the peritoneum has crept on without pain, fever or other marks of acute inflammatory action, our first and best hope of evacuating the collected liquid will rest upon diuretics. Hepatic ascites and renal disease may be sometimes found in conjunction; but according to the writer's observation they seldom are so : and, except that both may

probably owe their occasional origin to habits of intemperance, there appears
no reason why they should be. Diuretics may therefore be administered
without scruple. The drastic purgatives are also to be employed when diu-
retics fail to act, or to reduce the swelling, and when the disease is not already
complicated with diarrhœa. And, inferring with more or less certainty the
existence of hepatic disease, sometimes from palpation of the enlarged or
altered liver, sometimes from coincidence of jaundice, but most of all from the
result of accumulated experience respecting such cases, it will be proper to
give the patient the chance of the remedial influence of mercury. The disease
being chronic the introduction of that drug should be gradual. An eligible
form of medicine for that purpose is furnished in Dr. Ballie's mercurial diuretic
pill (see p. 496). The iodide of potassium is thought by some physicians to be
especially serviceable in such cases. It may be given, in solution, in doses
gradually increased from five grains to a scruple, three or four times a day ;
or compounds of mercury and iodine may be applied, by the method of inunc-
tion, to the surface of the abdomen, and to the hepatic region in particular.

In Germany the muriate of ammonia is in much repute as a therapeutic
agent. This salt, though seldom administered internally in this country, is
believed by some practical men who have employed it, to exercise all the
beneficial influence upon the functions of the liver which is commonly attributed
to preparations of mercury, while it is less frequently productive of distress or
inconvenience. The experience of the writer upon this point has been too
limited to warrant his expressing any confident opinion ; but in some recent
instances he has certainly noticed a remarkable improvement in the condition of
the biliary excretion, after the daily exhibition of a combination of cathartic
extract, sal ammoniac, and the extract of taraxacum.

But our efforts to remove by medicine the accumulated liquid, or to cure the
morbid condition on which the accumulation depends, are too often made in
vain. The distension of the peritoneum continues to augment ; the distress
arising therefrom becomes urgent and extreme ; and at length, to afford tem-
porary ease to the patient, and in the faint hope also of giving him permanent
relief, we resort to the mechanical expedient of paracentesis.

In ascites, equally as in ovarian dropsy, it is inexpedient to resort to para-
centesis, until it seem absolutely indispensable. To this rule there are in our
opinion very few exceptions.

The operation itself, though commonly esteemed a trivial one, is not without
its dangers. The instances are not few in which it has been followed by fatal
peritonitis ; excited either by the mere passage of the lancet or trocar through
a previously unhealthy membrane, or (in the case of ovarian dropsy) by the
escape of some portion of the contents of the cyst into the cavity of the
abdomen.

Formerly the rapid evacuation of a large quantity of liquid from the belly
was often attended by terrifying effects ; fainting, convulsions, almost instant
death. This made the ancient physicians afraid of the operation ; and when
they could no longer avoid it, they let the accumulated fluid out by little and
little at short intervals.

The cause of these alarming symptoms is now well understood, and easily
obviated. They were owing, doubtless, to the sudden removal of the pressure
to which the viscera and large blood-vessels had for some time been submitted
and accustomed. For this explanation of the fact we are indebted to the
sagacity of our celebrated countryman Dr. Mead, who was the first to suggest
that external compression should be substituted, in lieu of the tension taken off
by the operation. The complete success of that expedient fully justified his
ingenious opinion. We now drain the cavity of its liquid contents without
scruple or delay. A sheet or broad roller is thrown round the patient's body,
and tightened as the fluid escapes, so as to maintain an equable pressure, which
is continued for a while, and at length gradually withdrawn.

Other casualties occasionally happen. The trocar has sometimes pierced the intestine. In one instance, witnessed by the writer, clear serum issued for some time through the canula; but at length pure blood, not less than a pint. The patient sank, and no opportunity was given to investigate the cause of the bleeding. In another strange but well authenticated case the almost incredible quantity, twenty-six pints, of blood flowed out at the orifice made by the trocar, and afterwards separated into clot and serum. To the wonder of those who saw the incident this patient recovered from the tapping, and the source of the hæmorrhage is still a matter of conjecture.

And apart from these mischances, which arise indeed in but a limited number of instances, it must be remembered that paracentesis can seldom be contemplated as a mode of cure, but simply of temporary relief from distress. A few instances have happened where the liquid has been drawn off, and has not again collected; but such cases are very few. So also, according to the experience of the writer, are those, much talked of by authors, in which the kidneys resume their activity upon the removal of the dropsical fluid.

Ordinarily, the liquid re-accumulates, often with more rapidity than before; and again, and again, the hazards and the inconvenience of the operation must be repeated. Wherefore, in the writer's judgment, paracentesis in abdominal dropsy ought not to be performed, unless the quantity of liquid is so great as to occasion painful distension, or cause great distress of breathing by its upward pressure against the diaphragm,—or to give rise to some positive suffering or urgent inconvenience, which the evacuation of the water may be expected to remedy.

These remarks apply with the greatest force to the first operation; its repetition may be allowed with somewhat less reluctance. There is always some danger, when on subsequent occasions it is too long deferred, lest the diminished strength of the patient fail altogether under the exhaustion produced by the renewed drain from so large a surface.

It is seldom that tapping is many times performed upon the same person, when the complaint is mere passive ascites. The dropsy returns indeed—and again the operation is required. Meanwhile, in most cases, the health and strength rapidly deteriorate, and the patient sinks.

Acupuncture of the dropsical abdomen has of late been recommended; and cures, thus effected, have been announced. It is said, or supposed, that the inclosed liquid, oozing gradually into the cellular tissue of the integuments of the abdomen, is thence gradually removed by absorption. Of this method of treatment the writer has no practical knowledge.

Ascites either depends upon disease of the liver, or follows very late after dropsy in other parts of the body. Hence it is usually incurable when there is much general emaciation, for the effusion then depends upon the feeble condition of the constitution, at least as much as upon the disease of the liver. It is only curable when it depends upon engorgement or inflammation of the liver, which can be removed by art.

We coincide entirely with the views of the author as to the propriety of the operation of paracentesis. It is certainly always to be deprecated; and after the operation the abdomen often fills up more rapidly than before. We do not advise it in the early stages, as it is a temporary relief we cannot avoid resorting to it when the oppression is great and the diaphragm cannot descend.

The application of an ointment composed of an ounce of iodine ointment and of simple cerate, and one or two drachms of camphor on a linen cloth, to the abdomen, is of great benefit. A powerful remedy is the continued application of a broad roller, so as to keep up a graduated compression, with warm baths every two or three days to favour the cutaneous action. These remedies are most important adjuncts to purgatives. The bandage was first introduced as an habitual mode of treatment a few years since, at the Neckar Hospital, and in our hands has been a most useful remedy.   G.

SCROFULA.

The term Scrofula, or, as it is sometimes written, Scrophula, is derived from
the Latin word *scrofa*, and it was originally used by Vegetius* to designate a
disease in cattle not unlike the scrofulus glandular swellings which occur in
the human subjects. The Latin authors first adopted it as a nosological term,
using it to indicate swellings which are understood in the present day to be
scrofulous. It may be regarded as amongst the severer inflictions of our tem-
perate latitudes, not only from the frequency of its occurrence, but likewise
from its being generally intractable and opprobious in its nature, and when
affecting organs of importance, most fatal in its consequences. Cullen defines
scrofula to be "tumours of the conglobate glands, chiefly in the neck ; upper
lip and soft part of the nose tumid ; face florid ; skin soft; abdomen large."
Authors now, however, appear to agree that scrofula consists in the presence
of a morbid deposit, to which the name tuberculous matter has been given ;
so that the so-called scrofulous swellings of the neck, consumption, tabes
mesenterica, certain enlargements of the joints, eruptions of a peculiar kind,
many cutaneous ulcers, &c., are in fact scrofula, and owe their distinguishing
characteristics to one and the same cause, constituting varieties of the same
affection, manifesting itself in the different organs, whether these be the glands,
lungs, mesentery, bones, articulations, skin, &c.

From so many different textures being liable to the influence of scrofula,
from its sparing in its ravages neither age, sex, nor condition, and from its
assuming many and very different appearances, it becomes a matter of the
highest importance to acquire an intimate knowledge of its causes, nature,
and symptoms. Notwithstanding the opportunities of daily observation, and
the number of facts collected, the history of this disease is yet fraught with
much doubt and uncertainty. As far as the morbid structure and the symp-
toms attendant are concerned, very considerable progress has been attained,
but little has been done in the study of the remote causes, or towards ascer-
taining the intimate nature of what has been termed the scrofulous constitu-
tion. This may be somewhat accounted for by attention having been chiefly
directed to that period in which scrofula is fully established, while investigation
into that previous condition, which is the forerunner of this more obvious
state, has been comparatively speaking neglected. This is the more remark-
able, as from the time of Gordonius,† in the twelfth century, writers on scro-
fula have particularly dwelt upon the fact of there being a temperament or
diathesis proper to it. They state its more usual characteristics to consist in
an extreme whiteness and exquisite fineness of the skin, in fair hair and blue
eyes, in a soft and rounded form of the body, which is rather pleasing than

* Plerumque strumæ, vel parotides, aut scrofulæ jumentorum guttur infestant. (*De Re
Veterinaria*, lib. ii. cap. 23, b. c. 385.

† Hippocrates, Galen, Celsus, and the earlier writers generally, though they describe this
disease, do not appear to have noticed any such distinguishing constitution.

otherwise, and which is owing to a full developement of the cellular tissue effacing all lines and muscular projections; that frequently this constitution presents the aspect of a florid habit and full robust health; the integuments to the eye appear firm and elastic; although to the touch they are soft and flabby; the countenance, for the most part full and rounded, presents an expression of softness; the cheeks, tinted of a bright rosy hue, form a pleasing if not brilliant contrast with the whiteness of the skin; the teeth, which are pearly white, have a tendency to early decay; the lips are very apt to be swollen, especially the upper, which is likewise often chapped in the centre; sometimes the columna nasi and lower parts of the nostril are tumefied; the skin is easily irritated, and wounds made in it are difficult to heal; obstinate eruptions are excited by slight causes, as the stings of insects or the ordinary epispastic applications; and cases are even mentioned where, in scrofulous children, scented soaps have been sufficient to cause the immediate appearance of a papular eruption. (*Cyc. Prac. Med.* art. SCROFULA.)   There also often exists a tendency to excessive perspirations, which are sour and fetid to the smell.

The moral and mental faculties are usually of a pleasant cast, though often accompanied by irritability and impatience.   The intellect in early age is full of activity, vivacity, and cheerfulness; nothing is more striking than the ready appreciation of thought and feeling in children of this constitution: it is, however, deficient in firmness and solidity, and is too vacillating in its character for great enterprises.   As age advances, imagination evidently predominates over judgment.

Such is the constitution most ordinarily described as the scrofulous; it in many respects answers to the sanguineous temperament of old authors. Many however state, that the atrabilious or melancholic is likewise characteristic of this diathesis: " Beaucoup d'entre eux sont châtains ou bruns, ont la peau sêche et peu d'embonpoint. (*Baudelocque*.)   This crasis is distinguished by the dark complexion, the countenance swollen and pasty, the habit indolent, the functions of the body performed sluggishly and even imperfectly, the nervous energy feeble, feelings obtuse, and both the moral and intellectual powers occupying a low rank.   According to Dr. Thomson, the worst forms of scrofula occur in those of this temperament, and there can be no doubt that he is correct. (*Lectures on Inflammation.*)   Others more exclusively confine the scrofulous constitutions to that crasis which is termed the lymphatic (phlegmatic): indeed there are some who affirm scrofulous affection to be in great measure only an exaggeration of it; express strongly, says Richerand, all the characters attributed to this constitution of the body, and you have a faithful picture of scrofulous affection. (*Nosog. Chir.*)   The lymphatic temperament is characterised by a fineness and whiteness of the skin, roundness of form, want of firmness in the chest, muscular feebleness, and apathy of mind; all of which nevertheless present a condition which is perfectly consonant with health.   If this constitution be developed in excess, obesity with other inconveniences is the result; but it does not follow that there should necessarily supervene those glandular enlargements, ulcers, chronic inflammations, caries, &c., so common in the scrofulous, and which one would expect to be the case, were the view entertained by Richerand correct.   Although it is not to be denied that those of this temperament suffer greatly from scrofula, yet it must not be too hastily assumed that they are the most susceptible; indeed Guersent (*Dict. de Méd.*, tom. xix., p. 190) says, that of the great number he has seen so afflicted, the majority did not answer to the lymphatic temperament, and according to Baudelocque not one-half belong to it.

Whatever may be the relative frequency of this disease in different constitutions, it is evident, from what has been now stated, that no particular temperament nor complexion can strictly be called scrofulous.   Nevertheless, certain characteristics do exist by which an inherent predisposition to the disease

is indicated, and it follows that as scrofula consists essentially in the formation and presence in the various tissues of tuberculous matter, any condition of the system which, under certain exciting causes, is prone to its developement, may justly be termed a scrofulous diathesis. This condition we shall now endeavour to describe; before doing so, however, it is necessary to premise that its characters are progressive, and not always the same; that they are generally more pronounced if of hereditary origin, than when acquired in after life only.

The general form is frequently deficient in proportion and symmetry; the head being relatively larger than the trunk; the abdomen prominent, and the limbs small, with large rounded joints. The skin, usually opaque, becomes sallow in the dark-complexioned, while in the fair it assumes an appearance not unlike blanched wax. To the feel it is soft and flaccid, and presents but little elastic resistance to the touch, giving the impression, when pinched, of being thinner than is usual in persons of a healthy constitution. It is indeed owing to its being really very thin in texture, that the veins are seen ramifying beneath it. It rapidly shrinks away under privation, fatigue, or disease; but the effects of these being recovered from, its previous state of fulness is as quickly restored: this is owing to a deficiency in what has been termed stamina, or enduring tone. When this constitution is more marked, the skin becomes coarse and dingy, generally dry and harsh, excepting in the palm of the hand, which is bedewed by an unhealthy cold moisture, and very subject to various eruptions of a scaly or furfuraceous nature; the hair, especially in the morning, is dry and harsh to the feel, and looks as if undressed; the countenance is doughy; the cheeks are full and rounded; the upper lip and nose swollen; the eye large, with a very open pupil; the eyelashes, unless destroyed by conjunctival inflammation, long and handsome. The tips of the fingers are square and flat, presenting that appearance which is termed clubbed.

The powers of the body are very inadequate to the apparent strength of the mould in which it is cast: fatigue is soon experienced, and the period of renovation is protracted. The circulation is generally feeble, as is indicated by a weak pulse and cold extremities. This state of the circulating system forms an element in the tuberculous constitution (*Clark on Consumption and Scrofula*, p. 15); it is rarely found wanting, and may be regarded as affording an explanation of many of the phenomena of the disease. The functions of digestion are much enfeebled; the bowels become irregular, for the most part torpid; and the evacuations, especially in infancy, are not healthy; the urine is scanty, and ammoniacal; the cutaneous secretions are very irregular, sometimes suppressed, at other times excessive; their character is also diseased, being occasionally more or less fetid, and usually leaving a reddish stain on linen if worn many days. The nervous system is characterized by an exaggeration of its natural bias; the irritability or apathy of the constitution, as the case may be, becomes more marked. Protracted and frequent sleep is ordinarily much indulged in, and after slight exertion is profound in the extreme.

In order clearly to understand the history of scrofula it will be necessary to consider it in its different stages; first under its simple or uncomplicated and more usual forms, and afterwards as it occurs in particular organs.

The first or incipient stage is when, as yet, no tubercular deposit has taken place. The consideration of this very important period of the disease has been mainly neglected. In its description will be included many of those symptoms which have hitherto been identified, though most improperly, with the scrofulous diathesis.

The countenance, to the casual observer, presents the appearance of good and excellent health; a more accurate observation, however, betrays this appearance to be illusive, and that, in fact, the cheeks which look so full and rounded are really softer and more flaccid than is proper to robust health. The

countenance, after very slight fatigue, is often expressive of mental distress, as well as of bodily fatigue; it has altogether a haggard and worn expression. The cheeks have a hectic flush, increasing by its effect the brightness of an evidently excited eye. As this stage advances, the countenance loses its fallacious appearance, and takes on a hollow and jaded character: should the complexion be sallow, the unhealthy appearance is very marked; it is dull, untransparent, and doughy; and the lips become pale and deficient in colour. The last joint of the fingers becomes swollen and rounded instead of tapering, and the nails have a tendency to assume a square form and bend forwards.

During this incipient period of the disease, nothing is more annoying than the great liability to colds and slight feverishness. The most trivial causes appear to excite inflammatory action in the mucous membranes, during which all the other symptoms are aggravated. The patient complains of frequent faint perspirations, alternating with a dry feverish state of the skin, which is very irritable, as is shown by the effect of any slight wound. The cold clammy extremities are very liable to chilblains. The mucous membrane of the nose becomes inflamed, and discharges a thin acrid sanguineous matter, which excoriates the external surface; the alæ and septum become swollen. The air, passing through with difficulty, obliges the sufferer to breathe in great measure through the mouth; so that the half open mouth becomes almost characteristic of the disease. The upper lip participates in the swelling, and now is seen the chap in the middle of it,—a symptom of the disease itself, and not of the diathesis only, as is usually stated to be the case. The inner membrane of the eyelids is often irritable and inflamed; and the eyelashes, generally so long and beautiful in the scrofulously disposed, drop off and leave the eye unprotected;—the cause of great weakness and irritability in the eyes themselves. This stage in short presents all those appearances that we might conclude likely to occur in a subacute state of inflammation of the mucous membranes.

On its accession there is, in those of a sanguineous temperament, an exhalation of the mental powers. The perceptions are quickened, the expressions are lively and brilliant; while, in persons of the cold and phlegmatic constitution, there is an increase in dulness of perception, and a more marked tendency to lethargy and inaction. The nervous system participates in the morbid changes, and shows more sensibility than is natural. The temper is often much changed; for the most part it is placid, quiet, and relying, though often, especially so in those of a bilious temperament, desponding and perverse. The sleep is disturbed with dreams, and not unfrequently attended by weakening perspirations of an offensive character. The patient during this stage, though complaining often of illness, scarcely knows how to describe his sensations, feels no one symptom of sufficient importance, but seems generally complaining and unwell.

The next stage of the disease, generally occurring between the second and twelfth year of life, is characterized by indolent swellings of the glands, cellular system and joints. In milder cases, these occur in the form of small spherical or oval tumours, movable under the skin; they are generally enlargements of the conglobate and lymphatic glands, an effusion of fluid being often perceptible, which is exterior to the body of the gland, and contained in, and circumscribed by, the adjacent cellular membrane. (Goodlad, *on the Absorbent System*, p. 75.)

The distension which this effusion produces is a source of additional irritation. Very often the cellular system is the exclusive seat of this stage, and in many parts of the body cold indolent swellings arise, which, unless repressed, are apt to pass into obstinate sores, burrowing under the surface, and forming extensive sinuses. These swellings are soft, puffy, and immovable, and not attended by any discoloration of the skin.

The glandular swellings are soft, with a feeling of elasticity, which frequently continue stationary for some period. Their more usual seat is in the neck, under the ears and chin. The joints of the elbows, fingers, toes, knees, &c., become swollen, and at times stiff; these swellings are not movable, as else-

where, consisting rather of a diffused tumefaction, and which, when excessive, very obviously impedes the free action of the joint.

Whether it be the glandular or the cellular tissue, or the joints themselves, that are thus affected, there is every reason to suppose that they undergo all the stages of inflammation, but, as Dr. Thomson properly observes, in each of these stages it exhibits phenomena which are peculiar to the scrofulous constitution. Some have maintained that these swellings have not essentially an increase of temperature, and there can be no doubt that the tumefaction is far greater in proportion than either the degree of heat or the pain; there can, however, be no doubt that these swellings are accompanied from the first with a sensible degree of heat, slight redness and pain on pressure; occasionally the heat and pain becomes excessive. The lymphatic glands of the neck are most frequently affected, probably because they are so generally exposed to cold (Alison, *Edin. Med. Chir. Trans.*, vol. i.); frequently only one or two are thus affected, sometimes so many of them, and to so great a size, as to cause the most painful results from pressure both on the air-passages and blood-vessels. It is not a little singular, that while very slight irritations have the effect of originating swellings in the glands, yet that the more severe irritation of teeth-cutting, though fraught with so many other graver maladies, very rarely induces them; these swellings in fact seldom occur until after the period of dentition, or even the second year, when they are easily excited, especially after febrile and eruptive diseases. The glands of the groin and axilla are less frequently affected than those of the neck, and even when this is the case, they are generally not of the true scrofulous character, but rather the result of simple inflammation occasioned by absorption or other irritation. The swellings in the subcutaneous cellular tissue, which are the adventitious glands of Wiseman, are soft and puffy, and manifest but little or no disposition to suppurate. (*Surgery*, vol. i. p. 403.) They often appear very suddenly, and from the absence of pain and discoloration, may exist a long time without being perceived. They are usually of an oval figure, and seem to be produced by the effusion of a fluid into the interstices of the cellular texture. They are very variable in their size, being one day more prominent and tense, and the next more sunk and flaccid. As this stage progresses, the tumours increase in number as well as in volume.

The third stage consists in the more active state of the disease, as evinced by lancinating pains, febrile excitement, &c. Some portions of the superjacent skin become pale, and one or more small openings spontaneously occur, by which the fluid is poured out. Though this is much like pus at first, it is different from that which proceeds from an ordinary abscess. As the discharge continues, it becomes less thick, until at length little else is exuded than a viscid serum, intermixed with white tuberculous matter resembling the curd of milk, and which offers the true distinctive character of the disease. Mr. Goodland describes three different modes by which this period of suppuration is arrived at. In the first there is an early effusion of fluid exterior to the gland. The abscess feels soft like a bladder not entirely filled, and what would otherwise be the most convex part of the swelling appears almost flat. The fluid which is discharged when the abscess bursts, consists of flakes of coagulable lymph, swimming in a half puriform fluid. The pus is formed exteriorly to the gland, so that, when the skin and cellular membrane are absorbed, the cavity of the abscess is very superficial, and the tumour continues almost as prominent as before the discharge of the fluid. In the second, the progress of the ulcer is attended with simple enlargement of the glandular substance, or of the adjacent parts, caused by the effusion of coagulable lymph, through which blood-vessels ramify themselves. In the third species, the abscess is formed in the substance of the gland, and a portion of its parietes must be absorbed before ulcerations can take place. If the cells of the gland are separated by adhesion, each cell may contain an abscess, and successive openings are formed for their discharge.

In the subcutaneous cellular tissue this disease presents itself in the third

stage under the form of chronic phlegmon passing into abscess. The progress of these swellings is often very protracted, and accompanied by only a slight increase of heat and a sensation scarcely amounting to pain ; the skin is of a dull red ; and the form of the swelling, instead of being circular, as in ordinary phlegmon, is oval.

The pus is similar to that which is found in scrofulous glands in character. These subcutaneous abscesses may form on the hairy scalp, neck, chest, belly ; in fact, no part is exempted from being occasionally the seat of them. The abscess which forms in a lymphatic absorbent gland often gives rise to the production of a fistulous sore, while that which occurs in the subcutaneous cellular texture most frequently terminates in an open scrofulous ulcer. (Thomson, *op. cit.* p. 159.) The contents of these abscesses sometimes become chalky. This only happens, however, when the progress of the abscess has been marked by unusual indolence. Occasionally another series of changes marks the progress of a scrofulous gland. The lymph effused into its substance becomes organized into a dense hard tumour, covered by a red shining thin integument, in which, after a certain period, a number of small apertures takes place, thus presenting a honeycomb appearance ; from these there exudes a thin serous discharge.

The scrofulous ulcer presents peculiarities which are sufficiently characteristic. Its margins are smooth, obtuse, overlapping, hard and tumefied, and have a purple or rather dull red colour. The surface of the sore is of a light red. The granulations, which rather resemble raw flesh, are flabby, indistinct, and present a glossy appearance. The discharge is thin, slightly ropy, copious, with curdy-like flakes. In this condition it remains for some time, being exceedingly indolent, and if excited to action rather ulcerating than throwing out fresh granulations. It is not usually attended by much pain, is naturally indolent, and very difficult of cure.

Such may be considered the more ordinary forms of what is termed simple scrofula. This disease occurs, however, at times in almost all the organs of the body, and under many modifications. Several of the eruptive diseases have been esteemed essentially scrofulous on account of their being found so frequently accompanying the disease, and because they often yield to the anti-strumous medicines. Amongst these affections the porrigo favoso, porrigo furfurans, and porrigo larvalis, acne indurata, eczema impetiginoides, and eczema rubrum are generally stated to be the chief. There does not, however, appear sufficient ground for arbitrarily deciding that they are so ; nor, if we regard them as not having in their constitution any thing of a tuberculous character, does it appear consonant with the definition of scrofula so to include them. They are far better stated as being diseases often associated and complicated with scrofula. Lupus however appears to be a true scrofulous disorder, " commencing by the slow developement of a tubercular induration in the tissue of the true skin, or mucous membrane, sometimes perhaps in the subcutaneous or submucous cellular tissue." (*Cyc. Pract. Med.* art NOLI ME TANGERE.) This indurated tubercle may either be single or grouped. The progress of the tubercle towards the surface is marked by the violet colour of the integuments, which spreads superficially as the tubercle makes its way. The cuticle is eventually broken, and then a scab of a coarse laminar appearance is formed from beneath, whence exudes a thin ichorous foul discharge. On this crust falling off, an ulceration of a most malignant character is exposed. Lupus is occasionally only superficial ; at other times it is a deep and erosive disease ; in other instances it is attended by a true hypertrophy of the neighbouring parts.

The deposition of tuberculous matter in the subcutaneous system has already been spoken of and shown to be identical with Wiseman's adventitious glands. So much do they resemble glandular swellings, that those not practised in seeing them might easily be deceived ; they are composed of cysts having a firm inner lining of coagulated lymph, presenting somewhat of a fibrinous appearance ; the

interior is filled with tuberculous substance, either in a crude state or as curdy pus. Another form of scrofula in the cellular system is that species of abscess named by the French *abcès froids* and *abcès par congestion:* these abscesses, which rise rapidly, are generally found in the interstitial membrane, separating the muscles or under the fasciæ. Their contents are at first serous; then sero-purulent, intermingled with curdy flakes; more rarely they consist of a thin pus. This is usually the nature of the abscesses surrounding scrofulous joints.

Another and very inveterate affection of this tissue is one which manifests itself by the skin assuming a livid colour and becoming hard and stiff. In this state it may remain many months; and though no outward sore is visible, yet there is beneath the surface a most mischievous process going on. This is brought to light by the formation of a small abscess caused by the irritation of the dead portion of cellular tissue; which is of a yellow colour and firm consistence, and is discharged only on a free opening being made. It is a most obstinate form of disease, and we believe answers to what Rayer terms *scrophule vulgaire vasculeuse*. Another form we have had an opportunity of observing has been that of an ulcerative process going slowly on in the cutis vera imme-diately below the surface, the surface itself presenting rather a more exsanguine-ous appearance than is natural. As the disease eats away the understratum, the superficial integument breaks down, presenting an open wound of a fleshy glistening character. In the cases to which we allude, this process goes on to a very great extent. It is a form of disease very difficult to control, and on recovery leaves deep and disfiguring cicatrices.

The mucous membranes are a very frequent seat of scrofulous disease. Dr. Alison in his valuable paper states, that he has observed the tuberculous matter in the free surface of these membranes, and that it is deposited loose in the air-cells. This view of the subject has however been opposed by others; and Gendrin, especially, maintains such to be nothing more than the product of in-flammation, and not true tuberculous matter. (*Hist. Anat. des. Inflam.* vol. ii., p. 310.) Dr. Carswell, however, takes the view of Dr. Alison, and his very accurate dissections should almost place the question beyond a doubt.

The mucous membrane of the nose in scrofulous subjects has been previously spoken of as frequently liable to a state of irritation and disease; occasionally this takes on an aggravated form. It ordinarily commences with trifling tume-faction and redness about the alæ nasi, attended by a mucous discharge which obstructs the nostril; as the disease advances, the discharge becomes thin, puri-form, and so irritating as to cause frequent sneezing. The odour exhaled is so offensive as to be disagreeable to all save the sufferer himself, the destruction of the membrane preventing his being sensible of it. Should the disease not be controlled, the septum becomes perforated, and the spongy, and even in some cases the nasal, bones are destroyed.

The mucous membranes of the eye and lachrymal passages are very fre-quently affected. Mr. Lloyd gives a description of what he terms scrofulous ophthalmia; in which he mentions, amongst other symptoms, a thickening of the eyelids. (*On Scrofula*, p. 312.) The frequency of this disease is con-firmed by many observers. In Vienna, according to Beer, nine-tenths of the cases of ophthalmia in children are of scrofulous character; and at Breslau it is estimated, by Benedict, to bear the yet higher proportion of 95 to 100.

Dr. Cumin says, " The eruption of the minute vesicles (phlyctenulæ) or pus-tules, which occurs in scrofulous inflammation of the conjunctiva, seems to ap-proximate it to other diseases of the same class, when numerous crops of very small tubercles are seen on the investing membranes of various organs; but it does not appear that true tuberculous matter has ever been detected in any part of the eye."

The mucous membrane of the digestive canal is very liable to be affected by scrofula; occasionally small spots of ulceration, which appear referrible to this

cause, are found upon the surface of the pharynx and œsophagus. Dyspepsia has been stated by Dr. Todd to be a prominent symptom of the scrofulous con- stitution ; we are therefore prepared to find the stomach and intestines the frequent seat of the affection. Amongst the lesions which may be esteemed of scrofulous origin in the stomach are softening and thinning of its coats, but more especially a mammillated and grayish appearance of its mucous membrane. (Louis, *on Phthisis*.) Instead of its natural uniform and velvet-like surface, it presents prominences of different forms and dimensions, generally rounded, from one to two lines in diameter, resembling the fleshy granulations of wounds, and occasionally separated by deep fissures of variable length and a line or rather less in breadth. These prominences are almost always of a grayish colour, mingled with a pale red tint. The mucous membrane often passes into a state of ulceration, the sides of which are circumscribed, and not elevated. In the small intestine the softening is not so frequent as in the stomach, but the granu- lations of the semicartilaginous and tuberculous nature, as well as ulcerations, are very commonly met with : these last are more frequent than the granula- tions, whence Louis concludes that they are often unconnected with them. In the submucous cellular tissue of this intestine there are occasionally found minute abscesses, which may be considered as proper to scrofula. The large intestine is subject to much the same lesions as have been observed in the small, with the exception of the semicartilaginous granulations. The tuberculous granulations are situated either in the centre or the circumference of the ulcera- tions, and not in their intervals. Thickening (and this is an important scro- fulous lesion) is often attended by softening and increase of colour, evincing the presence of a very low state of inflammation. Carswell says, this is very fre- quent, and that it is the consequence of the presence of tuberculous matter, as is evidenced by the increased vascularity, softening, and ulceration of the folli- cles and mucous membrane generally of the intestines and bronchi. These ulcerations always occupy the situations in which tuberculous matter is most frequently deposited.

The serous membranes, equally with the mucous, are liable to this deposit ; minute tubercles and tuberculous matter in greatest abundance are met with scattered over their surface and imbedded in their tissue. The pleura, the peri- toneum, the arachnoid, are each the test of this deposit, and Dr. Baillie men- tions the instance of its occurrence in the pericardium. When this disease at- tacks the membranes of the brain, it causes effusion and all the symptoms of hydrocephalus. This takes place much more commonly in infancy than is usually suspected ; children of scrofulous parents being often afflicted and dying from it. Its occurrence in the peritoneum is first made evident by serous fluid being exhaled into the cavity amongst which are floating flakes of tuberculous matter : these increase, while the serum is reabsorbed, leaving the intestines glued together by the curdy deposit.

Perforations in the intestines are sometimes owing to ulcerations originating in the serous coat, and eating their way inwards, though more usually the con- trary is the case, the ulceration commencing in the mucous coats and destroy- ing from within outwards.

The synovial membranes are liable to scrofulous disease. Dr. Craige states that no doubt can be entertained of the frequency of albuminous deposits, and he believes that tubercles have been seen in the coxo-femoral synovial mem- brane in disease of that joint, though he has not had an opportunity of verify- ing it. (*Elem. of Gen. and Path. Anat.* p. 810.)

The osseous system is very frequently affected in scrofula. Wiseman indeed says that the bones are scrofulously diseased as often as any other part of the body. In the tuberculous constitution, the bones are more slender throughout, their cortex or outer wall is much thinner, and their interior more soft and vas- cular, than the bones of persons of sound and vigorous constitution. Unlike syphilis, which generally affects the more hard and compact portions, scrofula

attacks the softer and more spongy, as the heads of the cylindrical bones, bones of the carpus and tarsus, and the bodies of the vertebræ. According to most writers, there is first a slight increase of vascularity, the effect of which is an absorption of the earthy matter of the bone, in consequence of which it becomes much softened, so that it may be cut with a knife as if it were cheese. This condition is often very limited, the surrounding parts appearing quite healthy ; at other times the whole bone participates in the injury. As the disease advances, the fluid which is proper to the cancelli becomes thick and caseous, in consequence of which an irritation is set up, a gelatinous fluid is thrown out, and thickening and hardness ensue. In the course of time, vessels carrying red blood ramify through the cartilages, which ulcerate : this process commences in small spots on the surface, which is connected with the bone. Occasionally a portion of caseous bone dies and exfoliates. The effect of these injuries is the effusion of serum and coagulable lymph, whence the puffy swellings so frequently observed ; then the formation of abscess, which makes its way through the synovial membranes, ligaments, &c., discharging itself externally by openings connected with different sinuses. Mr. Lloyd says, that if a scrofulous bone be injected at an early period of the disease, or before the whole of its cancellous structure is altered, the injection very freely enters its vessels ; but if it be injected at a more advanced period, there evidently appear to be fewer vessels ; though it is very probable that a fine injection may be forced into vessels which previously ceased to carry red blood. (*Op. cit.* p. 123.) Sir B. Brodie believes this observation to be correct, and that in the last stage of this disease the bones not only lose their vascularity which they possessed at an earlier period, but even become less vascular than healthy bone ; and that this diminution of the vessels, and consequently of the supply of blood, is probably the cause of those exfoliations which sometimes occur where the disease has existed for a considerable time, especially in the smaller bones. (*Diseases of the Joints*, p. 246.)

The form of scrofula is very insidious in its origin,—even when serious lesion is established there is often so little local uneasiness, as scarcely to call attention to the part,—weakness, and some little occasional tired feeling, being perhaps the only circumstances complained of, and these so lightly as to be attributed rather to a weak state of the general health than to local affection. As the disease becomes established, the symptoms are more marked ; a dull, heavy, constant pain is experienced, which, though felt to be deep-seated, is not increased by pressure, nor aggravated by motion, unless the disease be in the hip, knee, or ankle joint. The explanation of this is, that the soft parts, after exertion, do not so well maintain the relative positions of the bones, and therefore pressure ensues. This stage of the disease is often protracted without much alteration taking place in the symptoms ; generally, however, as it advances, the pain becomes more decided, and there is, towards night, or after exercise, evident enlargement in the soft parts, which is owing to some little increase in the secretion of the synovial fluid. Eventually the pain becomes excessive, the inflammation very marked, the general health participates in the local injury, hectic fever, and night sweats set in, the pulse becomes weak and quick, and a diarrhœa together with the discharge from the extensive abscesses tend to weaken and destroy the constitution.

The spinal column is also a frequent seat of tuberculous deposit. The bodies of the vertebræ are subject to much the same series of changes as already described. When the softening and caries are fully established, the bodies of these bones no longer support the weight above them, but, yielding to the pressure, angular curvatures are produced. Most generally the curve is from within outwards ; though at times, when one-half of the bone is more affected than the other, lateral angular curvature is produced.

The periosteum is sometimes a seat of scrofulous affection. It is attended by inflammation, abscess, swelling, exfoliation, and destruction of the bone it

covers, and according to Dr. Cumin, to absorption of the osseous tissue, which is replaced by dry tuberculous substance without softening of the bone ; and that to this form of tuberculous disease are to be referred some of those cases which have been named osteo-steatoma. This morbid deposition, which he has observed lying in contact with the bone in large angular masses, bears a striking resemblance to suet or adipocire, but its nature is truly that of coagulated albumen, for it emits, under a strong heat, the odour of burnt cheese or horn, and produces no greasy stain when rubbed on paper.

The advanced state of medical knowledge in the present day has shown that scrofula is not essentially a disease of the lymphatic system ; its vessels, however, are frequently a seat of tuberculous deposit : this is especially the case when the glands are affected, and may generally be observed when those of the mesentery are tuberculous : occasionally they are thus rendered quite impervious. The thoracic duct is even sometimes affected : Mr. Cruickshanks relates a case in which two-thirds of it were filled with a caseous matter. This patient had scrofulous affection of other parts at the same time.

The lympatic glands we have already particularly alluded to. Those most frequently affected are the submaxillary and sublingual. The parotid gland and tonsils are not so frequently, though swelling is very usual in them when the cervical glands are enlarged. Dr. Cumin says, tumefaction of the tonsils is seldom absent, if the strumous constitution be strongly marked ; and that it may exist from an early period of life, or even in some instances be congenital. These swollen tumours are very liable to inflammation, to aphthous sores, and ulcerations.

The glands of the mesentery are very frequently scrofulous. At the commencement of this disease, the appearances presented are minute spots either in the centre or circumference of the glands, interspersed through a structure unusually red, and less consistent than natural. The glands so affected are generally found in masses. In the more advanced stage, that condition of system is established which is known under the name of *Tabes Mesenterica.*

The mesocæcal, mesocolic, and lumbar glands are occasionally, though not so frequently as the mesenteric, the seat of the disease. The bronchial glands are very often affected, being increased in volume, of a grayish and black colour, and occasionally, though more rarely than is the case in other glands, tinged with blood.

In the arm-pits and groin the glands are very apt te swell, inflame, and be destroyed by the formation of abscess ; generally speaking, however, this is not owing to scrofulous disease, but rather to ordinary inflammation. When the true scrofulous disease occurs in those of the groin, it is usually as a concomitant of scrofulous disease of the femur. The thyroid is very seldom, almost never, the seat of tubercle : and although that peculiar swelling called Bronchocele is not infrequent in those of a lax and infirm habit, and, in fact, in those who are suffering from scrofula, yet the origin and progress of bronchocele is so different from that of this disease generally, that we are inclined to view it as not of this nature.

When the tongue is affected by scrofula, blisters or aphthous crusts form, on the removal of which a sore is left, often very difficult to heal. Its more characteristic features are described as small knots or nodules superficially imbedded in the substance of the organ, varying in size from a grain of small shot to that of a horse bean. They cause no uneasiness unless when firmly pressed, and then the pain is pricking. The mucous membrane covering them is red and prominent, and soon breaks in the centre, giving rise to an ulcer which spreads and destroys by sloughing erosion, with much pain, profuse salivation, furred tongue, and fetid breath. (*Cyc. Pract. Med.*, vol. iii., p. 707.) In some protracted cases, the tongue is the seat of an albuminous exudation : when this occurs, there are almost invariably prickings in the tongue, heat and redness. This exudation occasionally occurs in the form of patches from two to three lines in

surface, which occasionally by their reunion completely cover the tongue: at other times it assumes the form of small points more or less thickly scattered, and attended by destruction of the corresponding mucous membrane. The redness, heat, and prickings, together with the albuminous nature of the secretion, distinctly point out an inflammatory condition, and yet the mucous membrane of the tongue beneath the exudation is often observed to be quite pale.

In children the spleen is very frequently scrofulous, but in adults this is but rarely met with. Small masses of the size of a pin's head or hemp seed are deposited in the cells of the organ: occasionally, however, it is almost entirely filled with large masses.

In the pancreas, according to Lombard, scrofulous disease occurs more frequently than is supposed by other writers. Of one hundred dying scrofulous, in five he found the deposit in this organ. Dr. Carswell, on the other hand, says, he has never observed it in the human subject, and only once in the monkey.

The liver though functionally so much deranged, is not very frequently found in a scrofulous state. Lombard, in those he examined, never observed it: Dr. Carswell has met with it in children, in the form of small masses, but has never seen it in adults. In these cases, tuberculous deposits are generally found in other organs at the same time.

Scrofulous disease of the lungs, from the frequency with which it takes place, and the importance of the organ affected, requires the most serious consideration, though it would be here out of place to enter into any history of its progress in this organ. (See *Tuberculous Disease of the Lung.*)

Though cases are mentioned of its occurrence in the circulating system, yet they are not frequent. Wiseman speaks of a scrofulous tumour of the heart weighing two ounces. Mr. Lloyd has observed it occurring in the granular form in the heart of a rabit. It has also been observed circulating in the general mass of the blood; and occasionally, though very rarely, has been met with in the muscles. (*Otto, Lombard, Laennec.*)

The organs of generation, both in the male and female, are very subject to scrofula. Tubercle has been observed in the bladder and ureters; cystitis is frequently owing to this deposit. It has also been observed in the vesiculæ seminales, in Cowper's glands; and Baillie says, that on cutting into the prostate, he has seen curdy matter precisely similar to that formed in the scrofulous absorbent gland, and that on pressure he has forced from its ducts a scrofulous pus. (*Morbid Anatomy*, p. 291.) Mr. Lloyd relates a case of phthisis, in which there was a difficulty in passing water for some time before death; the prostate gland was very much enlarged, and contained above an ounce of scrofulous matter. In another case it was so much enlarged, that on examination *per anum*, its boundary could not be reached by the finger, and it pressed so much upon the sacrum, that the finger could with difficulty be passed between them. (*Op. cit.* p. 110.). These cases are generally attended by gleet, which is often so much increased on sexual intercourse, as to assume almost the appearance of a virulent gonorrhœa, accompanied by much painful irritation about the neck of the bladder and through the course of the urethra. The testicle is also occasionally affected. The appearances on dissection resemble those exactly of a scrofulous gland. The first appreciable symptom is general enlargement, with increased softness of the organ; its natural shape is not altered. In the early stage, there is no pain unless pressed, and then it is very trifling; but when the coats of the testicle are diseased, the pain is very severe. The progress of this affection is marked by inflammation of this gland and scrotum, the formation of abscess, and a consolidating together of the whole diseased parts. It runs the usual course of scrofulous disease in glands, and does not require castration, as is the case when the testicle is the seat of more inveterate affections.

In the female organs, very troublesome affections result from scrofulous dis-

eases. The whole lining membrane of the vagina often becomes affected, and occasionally the interior of the uterus is involved. The character of the discharge from the vagina is altered; it assumes a greenish-yellow, often streaked with blood, and very acrid in its character, causing irritation, excoriations, and eruptions of a most troublesome description. This state of things is the source of much catamenial derangement, and not infrequently of many anomalous pains of the back and other hysteric affections.

Scrofulous disease of the mamma is not uncommon both before and after puberty. Its first symptom is a small oval movable tumour: this increases, and is followed by others. Unless there be inflammation, but little pain or inconvenience is felt. Should inflammatory action supervene, the swellings increase, and involving much of the gland, suppuration takes place, which eventually is discharged by two or three openings.

The brain and its membranes are more frequently the seat of tubercle than is generally supposed. When it occurs on the dura mater, the masses resemble precisely the structure of a scrofulous absorbent gland, and, like them, a curdy pus is often found in their interior. The occurrence of tubercles in the brain has never been sufficiently attended to. Dr. P. H. Green has made some very valuable observations on this subject. He affirms, that a long and laborious investigation of this interesting subject enables him to conclude, that, in point of frequency, the occurrence of tubercles in the brain in children must be ranged next to hydrocephalus; and that for every three cases of the latter disease, there exists one of the former.* (*Lancet*, Feb. 1839.)

On the other hand, tubercles in the brain in the adult subject are extremely rare. Of 117 phthisical patients examined by Louis, one only had tuberculous deposit in this organ. They often exist without producing any disturbance of the cerebral functions, and are only discovered after death. The most prominent symptoms which mark their presence are,—a constant or remittent headache, more or less intense, sometimes occupying the frontal region, at others corresponding exactly with the seat of tubercle; chronic vomiting occurring at uncertain intervals, and not apparently connected with disorder of the alimentary canal—a symptom, which, when conjoined with headache and constipation of the bowels, is of great value; some disorder of the motor power, manifested by irregularity of the gait, an incapability of harmonizing the movements, partial paralysis, or a contracted state of one of the limbs. The intellectual functions are seldom disturbed in the early stage; but as the disease advances, more or less change takes place, irregular accessions of fever (which is often mistaken for the infantile remittent) occur, with delirium at night; and in some instances the patient is gradually reduced to a state of complete idiotcy.

Tubercles of the brain, in children, commonly destroy life, either by inducing acute hydrocephalus, or by exciting inflammatory softening of the surrounding cerebral structure. Indeed, the relation between acute hydrocephalus and tubercle is much more close than has been generally admitted.

Scrofulous affections of the organs of sense are not infrequent. Of the eye we have already spoken. In the ear it frequently commits great havoc, both before and after the meridian of life. Thomson says that scrofulous affections of the ears often run in families, so as to produce a family deafness.

The inflammation succeeding the tuberculous deposit in this delicate organ

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* Tubercles in the brain are generally attached to the pia mater and seem to derive their nourishment from it; they differ from tuberculous meningitis in their slow growth and in the entire absence or very late formation of inflammatory symptoms. The signs by which they may be recognised are simply those of chronic paralysis gradually increasing, and either limited to one side or more marked on one than on the other. Inflammation is purely secondary, from the pressure and irritation of the tubercle in the substance of the brain, and when developed presents its ordinary symptoms.　　　　　　　　G.

is followed by suppuration, which destroys the tympanum, and the small bones come out. The delicate expansion of the auditory nerves, or the membranous linings of the different cavities, are either partially or wholly destroyed, thus producing partial or total deafness.

The *nature* of tubercle has recently been successfully investigated by various pathologists. Tuberculous formation differs in structure and appearance from all parts of the healthy body. It is an adventitious deposit, and is the distinguishing characteristic of scrofulous disease. Dr. Carswell defines it to be a pale yellow, or yellowish-gray, opake, unorganized substance, the form, consistence, and composition of which vary with the nature of the part in which it is formed, and the period at which it is examined. He states it to occur in four principal forms, which are,—1, in distinct round bodies, to which the name tubercle is properly applied; 2, in masses, which vary in size, and are commonly of an irregular shape; 3, diffused through the structure of an organ, when it receives the name of tubercular infiltration; and 4, when part or portion of an organ becomes converted into this morbid structure.

The tubercles when first recognisable are about the size of a small pin's head, sometimes of a reddish-drab or skin colour, sometimes gray or ash, and sometimes, though very rarely, devoid of colour, and very transparent. They are irregular in their outer aspect, of a firm consistence, not easily compressed, and adherent to the neighbouring tissue. They occur in this state either singly or in numbers, and are known by the terms miliary or granular. In this state they frequently remain for a long period. When they increase, they take on a whitish-yellow appearance. They rarely attain, as true tubercles, a larger size than that of a pea; though there are instances of their having attained the bulk of a hen's egg. When they are of the size of a pea, and have a yellow appearance, they are said to be in a crude state; shortly after attaining this, a slight appearance of softening is perceptible.

According to Laennec, the softening commences on the interior; according to Andral and others, on the exterior. It is the commencement of the last stage of tubercle; and, after a short time, it becomes broken down and converted into a fluid of a thin serous consistence, having a curdy-like mass floating in it. Mr. Calder recognises an appearance of tubercular deposit which is earlier than the miliary: he has observed in the peritoneum, mingling with the tubercles, many grayish-coloured spots of the size of pin's heads, not sensibly elevating the peritoneum, but distinctly visible through it. These spots, when more minutely examined, have a roundish shape and a distinctly circumscribed edge, and, when divided by a fine cutting instrument, can be satisfactorily ascertained, both by sight and touch, to be a substance, and not a mere appearance. These, Mr. Calder has frequently observed in the subserous tissue of the lungs and intestinal canal; and from his never observing them but in connexion with decided tuberculous disease, he is inclined to refer them to an earlier stage of tuberculous deposit than the miliary tubercle itself. (*Med. Gaz.* 1837-8.)

Tubercles occasionally go through a different series of changes; instead of passing into the cheese-like matter, they are submitted to what has been termed a cretaceous transformation. This change is attributed to the tubercle losing a portion of its animal constituents, thus acquiring an excess of its earthy particles (phosphates and carbonates of lime). Tubercles in this state present an appearance of a dirty white coloured mass, like wet plaster of Paris.

Tubercle acts occasionally as a local irritant, producing the ordinary effects of inflammation, and eventually abscess, in which pus and tuberculous matter are mingled together. The cavity of the abscess is lined generally by an adventitious membrane, which, if not mucous, is not very dissimilar to it.

The tubercular masses are generally caused by the agglutination of a number of the miliary points.

The interstitial infiltration of tuberculous matter, whatever may be the form under which it is developed, according to Laennec, presents, at first, the appear-

ance of a gray semitransparent substance, which gradually becomes yellow, opake, and very dense. This state rarely exists, unless tubercles in the miliary form are also present.

Sometimes the natural structure of an organ appears altogether absent, tuberculous matter being deposited in its place. This most probably occurs, not by a true conversion, but rather from an absorption of the natural structure in consequence of the deposition of the morbid substance.

The *origin* of tubercle is a matter of great interest. Very opposite views have been entertained upon it. The one, that their origin is inflammatory (*Broussais, Alison, Louis*): the other, that they are in no way dependent upon it (*Bayle, Laennec, Lobstein, Gendrin*); and that, if inflammation be present, it is the effect, and not the cause of tubercle. We shall endeavour, in as short space as possible, to explain what appears to be the more probable view of the question. Before the formation of yellow tubercle, an induration takes place, which differs from healthy structure by containing a larger quantity of a matter which is harder than the tissue itself. Dr. Williams (*Med. Gaz.* 1838–9) reasons very fairly upon this—that the increase of substance argues either increased secretion or diminished absorption. That absorption is not diminished in the tissues, is plain from the fact that portions of the healthy tissue are at the same time removed by this process ; and that increased secretion is present, is proved by the fact that the indurated texture presents new characters, and is not a simple accumulation of the matter of the natural tissue. There can be no doubt, according to the laws of physiology, that where increased secretion is present, there must be a larger supply of blood, which larger supply amounts to an inflammation, though of a low and generally of a chronic character. The discussion of this question, however, would occupy too great space ; we shall therefore briefly state, that we believe tuberculous or scrofulous disease to arise from a low inflammatory condition of the interstitial tissue, in consequence of which lymph of so low vitality is exuded, that it is incapable of becoming organised, or at least, susceptible of it only to a very low degree.

With regard to the original seat of tubercle, some difference of opinion prevails. Dr. Carswell states, that repeated, careful and minute anatomical researches have led him to regard the free surface of the mucous and serous membranes, and the blood, as the exclusive seats of the tuberculous matter; and that in no instance is this morbid product deposited in the molecular structure of organs. We have previously mentioned that Dr. Alison observed tuberculous matter existing in a free state in the air-cells. Mr. Calder premising there may be some misunderstanding about the term free surface, maintains that tubercles are always invested by cellular membrane.

The *composition* of the tubercular deposit is chiefly albumen with varying proportions of gelatin and fibrin, together with the phosphates and carbonates of lime, which occur in the same proportion as they are met with in bones. According to Thénard, one hundred parts of crude tubercle (pulmonary) contain

Animal matter - • • •	- 98·15
Muriate of soda	
Phosphate of lime	- 1·85
Carbonate of lime	
and some traces of oxide of iron.	

Scrofula readily associates itself with, and modifies the progress of, other diseases, more especially common inflammation, syphilis, diseases of the skin, rickets, and certain local and nervous maladies. Indeed, very few local inflammatory affections occur, in which the symptoms as well as the operations of food and medicines, are not more or less influenced by the scrofulous constitution ; and it is from this complication, that sores and many other similar affections are so obstinate of cure. Gonorrhœa and the diseases of the mucous

membranes generally offer striking examples of this fact. Scrofula and syphilis modify each other very remarkably; generally, both diseases run their course under mutual states of aggravation. Sometimes, however, the tubercular disease is arrested during the progress of this affection; on the subsiding of which, the scrofulous symptoms are renewed with redoubled aggravation. (Royer, *Obs. ex Praxi in Nosoc. Milit.*)

With some diseases of the skin, the complication is so frequent as to induce many writers to view them as essentially scrofulous. It is very certain, that when they do occur in a constitution of this tendency, they are aggravated in character, and more obstinate in resisting curative means.

Rickets, by many writers, has been erroneously esteemed a scrofulous disease : not only is its pathological state opposed to such a view, but it occurs occasionally in children, in whom there is not the slightest tendency to scrofula. Should it, however, be complicated with tuberculous disease, its treatment becomes troublesome and unsatisfactory, which otherwise is not particularly the case.

Scrofula is often combined with uterine affections. It has previously been observed, that, in persons of this diathesis, great tendency to catamenial irregularity prevails : generally, the recurrence of the period is too frequent, and the discharge excessive. The constitution soon shows evidence of its labouring under the weakening effects of menorrhagia. On the other hand, it sometimes happens, though much less frequently, that there is a total suppression of the discharge, or its recurrence takes place only at lengthened periods, and attended with more or less pain.

The scrofulous constitution is very liable to nervous disorder. In females of this habit, the symptoms are so often mingled with those of hysteria, as to render it difficult to distinguish which are to be referred to organic affection, and which to mere complication.

With regard to mental disorders, Dr. Cumin says they claim an alliance with scrofula which has not been sufficiently attended to. He states, on the authority of a physician eminent for his knowledge of these disorders, that more than one-half of those who are subject to mental derangement, are of a scrofulous constitution, the existence of which is manifestly indicated in these persons ; and that scrofulous symptoms often alternate with attacks of mania ; that purulent expectoration has often ceased during the urgent symptoms of insanity, and, on the other hand, reason has been restored before the pulmonary disease proved fatal. With the view of elucidating this, Dr. Cumin examined all the paupers of a lunatic establishment. Of forty-four females, exactly one-half presented indurated or enlarged glands of the neck or throat, and several had extensive scrofulous cicatrices. Of forty-six males, twenty-eight had no decided symptoms of scrofula, though several had the strumous aspect ; sixteen presented the marks already mentioned : in reference to the females, two belonged to families known to be afflicted with scrofula in an aggravated form. All of these ninety lunatics were adults, and not one of them exhibited any active symptoms of scrofulous disease. It appears, however, from the above that mental disease is not promoted by scrofula, though occurring in the same subject, nor scrofula promoted by mental affections ; on the contrary, when one disorder was in a state of activity, the other was at its minimum intensity ; in confirmation of this it has been observed, that where insanity has occurred in families eminently scrofulous, the least strumous were its victims.

Epilepsy is another occasional complication of scrofula. Dr. Cheyne goes so far as to think it as certain a manifestation of the strumous diathesis, as tubercular consumption itself. We cannot, however, view it in so strong a light. There can be no doubt that many, nay most, so afflicted, present strong characteristics of the strumous constitution : but, on the other hand, it occurs in those who can in no way be said to have this taint.

The *statistical history* of tuberculous disease has, of late years, been occupy-

ing much attention ; but as the results obtained have been rather deduced from those labouring under phthisis pulmonalis, it would be out of place here to go into minute details ; a few general remarks will be sufficient.

Tubercles are generally stated to be but very rarely developed until after the second year of life. We are inclined, however, to doubt the correctness of this opinion. Occasionally they are met with in the fœtus. Chaussier, Œhler, Husson, Billard, have each detailed cases ; yet Guisot states, that of 400 newly born children whom he had examined, he had not met with a single case. Billard relates instances of tuberculous deposits in the first months of life. We have examined infants in whom tuberculous disease was not suspected, and yet the deposit was found largely diffused in several organs. This leads to the conclusion that infants succumb to the influence of this affection more frequently than is suspected. Billard states some observations which fully bear out this view. He found tubercles in the lungs of four children who died at the respective ages of one, two, three, and five months, in neither of whom were any of the symptoms of phthisis developed as is usual in adults. The observations of Sir J. Clark tend to the same effect ; he met with many cases of extensive tuberculous disease in the first dawn of life. After the second year, however, there is a great increase in the developement of tubercle. According to Guersent, of those who died between one and sixteen at the Hôpital des Enfans, two-thirds or five-sixths were tuberculous : and Dr. Alison states, of the lower orders of children in Edinburgh, more than one-third of the deaths are from scrofula. Sir J. Clark has given a table which, as deduced from a large number of observations, is most probably accurate in its results ; it is calculated from 695 observations made by Papavoine and his colleagues, from which it appears that the period of life below the fourth year is the most prone to tuberculous disease. To speak, however, in general terms, it appears that scrofula exists in its greatest extent between the period of the first and second dentition.

Le Pelletier affirms that the number of strumous females as compared with males is as five to three. (*Sur la Maladie Scrofuleuse.*) This, however, is very much greater than is found to exist elsewhere. From another table of Sir J. Clark, and constructed from the returns of thirteen different hospitals, the proportion is found to be in seven of them much in favour of females : taking, however, the thirteen returns, and drawing the average from the whole, the prevalence of tuberculous disease bears the relation of 100 males and 106 females. In connexion with this it must be borne in mind, that on the whole population there is an excess of females over males, and this may render it a nearly equal division of the disease. In Dr. Home's report (*Edin. Med. and Surg. Journ.*) a contrary result, however, is shown to be the case ; and this is not owing to the admission of a larger proportion of males into the hospital,—the numbers being, males 4512, and females 4749.

Tuberculous disease is not confined to man. Farcy and glanders in the horse are both essentially scrofulous diseases.* Dupuy has shown that, in the latter, the leading feature is the formation of tubercle in the pituitary membrane (*Maladie Tuberculeuse*) ; while, in the former, the tumours called farcy buds are really tuberculous deposits. A large proportion of those ani-

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* This is a mistake. There is no similarity whatever between glanders and scrofula—the former is highly contagious, the latter not at all so. In many cases of glanders which have been communicated from horses to grooms and others in charge of the animals, experiments have been made by inoculating horses with the pus from the glandered men, and the same disease was developed rapidly in those animals. In scrofula it is well known that the same experiments have failed. The lesions in the two diseases are also totally different ; and there is no other point of resemblance other than that both affections are connected with a general disease of the system, and in both scattered purulent collections are formed in the glands which have a slight external resemblance one to another.   G.

mals which are imported into this country for the purpose of menageries, die
from tuberculous disease. This is especially the case amongst the monkey
tribe. Regnaud, who has had frequent opportunities of dissecting those
dying at the Jardin du Roi in Paris, states that the disease, as occurring
amongst them, is in every way analogous to its appearance in the human sub-
ject. We have enjoyed some limited opportunities of observing the same fact
in monkeys, two lions, and a kangaroo. In each of these the tuberculous
disease was fully developed. (*Arch. de Méd.* t. xxv.) The cows which are
confined in large towns are found soon to show evidence of this complaint;
and it is remarkable, on this occuring, the milk becomes more abundant.
The flesh also becomes softer, and in Paris is prized in proportion.

Mr. Newport has made some very interesting observations on the oc-
currence of tuberculous formations in insects, both vegetable feeders and
carnivorous. He was enabled to produce its deposition by submitting the
insects to changes of temperature, and supplying them with food of a dete-
riorated quality. From the results of an experiment upon the larvæ of the
Sphinx ligustre, he is led to conclude that these depositions in insects may be
produced almost at pleasure. About eighteen or twenty larvæ of this species,
collected just after entering their last skin, were confined in a box closely
covered, and kept, uncleansed, in a room the temperature of which ranged
from 65° to 80° Fahr., and were supplied with food of a deteriorated quality.
By this means their growth and the period of their changing were retarded.
In order to produce a sudden impression of cold upon them they were re-
peatedly plunged into cold water. The result was, that in the whole of them
deposits were formed, and generally in the secreting organs. (*Mr. Newport's
Letter ;* vide Clark, *op. cit.*)

Causes. The frequency of scrofula, the insidiousness of its approach, and,
when fairly set in, its inveterate nature, render an examination of its causes
of the utmost consequence. We have already shown that scrofula is a disease
of a tuberculous nature; and the probability that the immediate origin of the
characteristic deposit is due to a chronic, low, inflammatory condition of the
interstitial cellular system by which means albuminous deposit takes place from
the blood. We shall now turn our attention to those agents which have been
considered to excite such a condition.

The first in importance is hereditary influence. Different opinions have
prevailed upon the relative importance of this; some maintaining that it is
essentially and only of hereditary origin; some, that it is never so; and others,
that it may be both hereditary and capable of being spontaneously excited.
Much difficulty has ensued from confusing together hereditary disease and he-
reditary predisposition. (*Hunter's Works*, vol. i., p. 591.) Faur, White,
Diel, Henning, and John Hunter, are among those who have most prominently
opposed the view that scrofula is hereditary. The latter, however, while
maintaining this, allows the existence of an hereditary predisposition. Dr.
Thomson, whose writings are as clear as they are accurate and instructive,
puts the whole question in its proper point of view. " It had from time im-
memorial been observed that the children of those parents who themselves
have had scrofula become sooner or later affected with this disease; and from
this uniform observation and experience it was inferred, that scrofula was an
hereditary disease.

"This conclusion however has been denied, upon the grounds that children
are never born with the disease actually existing, and that it is improper to give
the name hereditary to a disease which is not immediately communicated from
the parent to the child. By keeping in view the distinction I have already men-
tioned, of scrofula as a disease which has actually manifested itself by attack-
ing some part of the general system, and as a predisposition, diathesis, or state,
liable to be attacked with, or to pass into, the disease, you cannot fail to per-
ceive that the dispute with regard to the hereditary nature of scrofula is merely
a strife about words; and that this controversy must cease, as soon as you affix

any thing like a precise and determinate meaning to the terms which you employ. If by applying the word hereditary to scrofula you mean to express that the disease is communicated directly by the parent, so as to appear in the child from the first moments of its existence, or, in other words, that the child must actually be born with the disease obviously existing, the question, it is evident, whether scrofula be hereditary or not, can only be resolved by an appeal to experience. I have not heard of any very decided example of a child being born with scrofulous glandular tumours on any part of the body, though the circumstance does not in itself appear to be at all impossible." The acumen of this intelligent physician has been fully borne out by the observations of Langstaff, Husson, Ohler, Andral, &c., who have detected tubercles in the fœtus. Though there can now be no doubt that both the predisposition, as well as the disease itself, may be derived from the parent,* there is also every reason to suppose that it is not exclusively so, as is stated by Le Masson, Delalande, and others. In fact, there can be little doubt that tubercular disease is both hereditary and capable of being acquired. Cullen, who has a strong bias in favour of viewing it exclusively as of hereditary origin, allows that it sometimes may be otherwise. Admitting it to be hereditary, some have attributed its origin to impregnation taking place during the menstrual period, in the parents being either too old or too young, or to accidents during gestation. These views, however, are supported by no solid arguments.

The Faculty of Medicine in Paris, in 1578, decided that scrofula was contagious: this view is scarcely entertained in the present day. Those who consider it so, mention as the media—intercourse (*Pujol*), inoculation with small-pox (*Deluc, Rowley, White*), and nursing (*Bordeu*).

That it is not communicated by intercourse, every day observation is sufficient evidence. Baudelocque quotes the fact, that in the Hôpital des Enfans 150 beds are occupied by children, some of whom are scrofulous, yet no result of the kind has ever taken place. The same negative evidence is afforded at the Hôpital St. Louis, where they are indiscriminately mixed.

Rowley, White, Dehaen, are those who chiefly maintain that scrofula has been introduced into the system with the matter of small-pox. No sufficient grounds however have been stated, which should induce us to believe that it makes its appearance more frequently after inoculation than after natural small-pox. We may indeed conclude from the following experiments, that it is not inserted with the variolous matter; for, in order to test this view, the endeavour has been frequently made to introduce this disease by artificial means. Hébréard and Lepelletier inoculated animals with the virus without success. Kortum and a colleague of Lepelletier experimented (most unjustifiably) upon children, while Lepelletier and Goodlad did the same upon their own persons with the like result. The humoral pathologists have very generally maintained, that scrofula may be communicated to a child by a nurse embued with the disease. Be this as it may, it must be admitted that a nurse of a scrofulous constitution is objectionable; for, as Labillardière has shown, the milk of a cow affected by tuberculous disease contains at least seven times more earthy matter than a healthy one, and consequently is less nourishing.

Many have thought scrofula to be a degeneration from the syphilitic virus. The question is important, not only from the authority of those who support it, but from its involving the whole question of the nature and treatment of scrofula. It was first entertained by Astruc, and in the present day we find amongst its advocates such names as Hufeland, Richerand, and Alibert: the latter states, by far the greater proportion of scrofulous disease to be only disguised cases of syphilis, which is modified by hereditary transmission; he feels assured that its occurrence in children is almost entirely owing to the debaucheries of their parents.

Notwithstanding this array of important names, we find little in their works

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* Tuberculous matter has been found in the umbilical cord.

on the subject, save the mere assertion, and which chiefly rests on the similarity of certain symptoms. Attentive observation, however, discovers sufficient to negative the views of their identity. Besides, we see that the children of syphilitic parents are born with the disease upon them. Bierchen, who maintains that the disorder of such children is scrofula, has evidently erred in his diagnosis ; and what he calls scrofula is doubtless no other than syphilis.

The experience of Baudelocque is, that children born of mothers infected with syphilis are not more prone to scrofula than when this is not the case. Another reason which has been advanced (insufficient even if the fact were substantiated) is, that the same remedies are applicable to both disorders. We shall have an opportunity of showing, when detailing the treatment, that there is every reason to believe the contrary to be the case ; an opinion maintained also by Richerand, one of the chief advocates of the view of syphilitic degeneration. As further negativing such a position we may allude to the circumstance of scrofula being known in Europe long anterior to the introduction of syphilis.

The external agents generally regarded as the exciting causes of scrofula are peculiarities in diet, situation, and atmosphere. Bad diet has usually been stated to exert peculiar influence. Though there can be no doubt that the disease greatly prevails amongst the ill-fed poor, yet on examining the question more fully, it would seem that the effects of diet have been greatly exaggerated, as the disease exists to a great extent amongst the well-fed also : in fact, were we to take our examples only from those in a parallel walk of life, the contrary conclusion might be stated as the correct one, for the poor of towns, who are much better fed than the poor in the country, are the more prone to it. Baudelocque, who states a vitiated atmosphere to be the sole exciting cause, and has analyzed all the other theories, in order to dispute them, brings forward many strong facts in favour of this position. He contrasts the scrofulous liability of the children of artisans in Paris with those in Picardy. The former who are well-fed are frequent victims of the disease, while the ill-fed enjoy a comparative immunity ; and he quotes the memoir of Madier on the medical topography of Bourg. St. Andeol, where it appears that food is good, abundant, and cheap, where situation and all other circumstances concur to produce a healthy district, yet the disease is found to be very common amongst the inhabitants ; and Bordeu states the more conclusive fact, of the sons of mountaineers who are sent into towns to qualify themselves as churchmen, and are better fed than their brothers in the mountains, and yet frequently become scrofulous, which is rarely the case with the others. At Palermo it is very notorious that the food is of the most innutritious and worst kind, yet among its inhabitants the disease is almost unknown.

Many writers have specified diets of particular kind as sources of its origin. Haller and Hufeland attributed its occurrence to the use of potatoes. The latter also attributes it to mothers not nursing their own children, but bringing them up by hand. In Normandy, however, where it is much the custom to rear children after this fashion, scrofula does not particularly prevail. The opinions with regard to diet have varied with the prevailing theories of the disease. If it have been attributed to the presence of acid or calcareous salts, so importance has been given to food containing these ingredients : if its origin have been thought to exist in the secretion of thick viscid lymph, so any thing causing a thick chyle, as soups, potatoes, &c., have been condemned. Milk by some is regarded as injurious, because it produces acid (*Bordeu*) ; while others look upon it as anti-scrofulous. The use of tea, coffee, an undue proportion of fluid to solid food, the inordinate employment of purgatives, spirits, &c., have each been severally stated as capable of producing the disease. It is useless, however, to quote at length these opinions, for it appears evident that scrofula attacks indiscriminately the well and ill-fed, and that no particular diet gives an immunity. At the same time it is not to be

denied, that when scrofulous action is excited, diet of an innutritious and un-
wholesome nature is exceedingly hurtful, and tends much to its aggravation.

The use of particular kinds of water has been so seriously dwelt upon by
many as a chief exciting cause, that an examination of its true bearing is neces-
sary. Our own most excellent physician Dr. Heberden, states his belief that
it is probably owing to the existence in it of some noxious quality, and quotes
in confirmation the history of the occurrence of scrofula at Rheims. The cir-
cumstances may be thus briefly stated :—This city was so afflicted with scro-
fula as to have a hospital, St. Marcon, specially devoted to cases of scrofula,
when a citizen from pure benevolence introduced into the town the water of
the Vesle, it previously being but ill and scantily supplied by tanks. Imme-
diately on this taking place, according to Thouvenel, scrofula almost entirely
ceased. This statement was made in 1777. In 1806, Desgennettes reports
that the hospital is again filled with scrofula, and that the water-works of the
Vesle are so out of repair as to supply but little water, obliging the inhabitants
to resort to their previous sources of supply. So far it appears conclusive,
but the searching investigation of Baudelocque throws doubt upon the whole.
He shows that the decrease of the disease commenced before the waters of
the Vesle were brought into the town ; and that there is every reason to be-
lieve that the decrease was attributable rather to some general improvements
in the place, while its recurrence is due to the establishment of manufactures.
Snow and ice water have by many been considered as a cause ; by others,
water containing lime ; this latter view has lately been very ably sustained
by Mr. M‘Clelland in his sketch of the topography of Kemaon. (*Dub. Journ.*,
May, 1837.)

Want of cleanliness has been very generally considered as a cause, and
Kortum explains this by supposing that it opposes free transpiration ; but we
see that scrofula occurs in those who are not uncleanly. The children of Pa-
lermo, to whom we have before alluded as enjoying a peculiar immunity, are
notoriously living in a state of the most squalid filth ; on the other hand, the
children of this country and of Holland, where the disease finds so many vic-
tims, are those of all others where cleanliness is most attended to.

The nature and variations of the atmosphere are also said to exert a power-
ful influence—a view which is by no means improbable, when we reflect that
it is the medium by which light and heat, moisture and electricity, all such
important agents as regards the animal economy, are applied to the sys-
tem. Considering the importance of the question, it has not been so philo-
sophically examined as might have been expected. The very excellent work
of Dr. Edwards (*Influence of Physical Agents on Life*) promises, however,
to create a new era in these researches.

With regard to the effects of light and electricity, but very few observations
have been made. Humboldt thinks he has remarked that a diminution of elec-
tricity in the atmosphere concurs to the developement and progress of scrofula.
The influence of this agent, however, has not been so examined as to induce
any reliance to be placed upon this vague opinion. Observation has shown that
light produces very serviceable effects upon vegetable existence ; and judging
from analogy, we are induced to infer that it exerts some influence on the
animal economy. Dr. Edwards has proved this by direct experiments, the
results of which are, that the presence of solar light favours the developement
of form as contra-distinguished from size merely (p. 210) ; and the principles
deduced involve the opinion, that in climates where nudity is not incom-
patible with health, the exposure of the whole surface of the body to light is
very favourable to the regular conformation of the body ; while, on the other
hand, we must also conclude that the want of sufficient light must constitute
one of the external causes which produce those deviations of form in children
affected with scrofula, which conclusion is supported by the observation, that
this disease is most prevalent in poor children living in confined and dark

streets (211). Daily observation, doubtless, shows us that those who are placed in situations where light is deficient, such as miners, prisoners, &c., are etiolated, unhealthy, and prone to scrofula ; but many other deleterious causes are united in those unhealthy situations, so that their effects cannot be separately estimated ; nay, it may be adduced as an argument almost conclusive against the agency of light, that many districts which are particularly liable to scrofula are open to the direct rays of the sun.   This is especially the case in the district of the Rhone, where the occurrence of cretinism is so frequent. Moreover, the experiments of Dr. Edwards, though showing that an influence of a powerful nature is excited by light, tend to prove that a deprivation of it would not produce scrofula, for whatever changes took place under these circumstances, they in no way proceeded from a decay of the individual.

Baudelocque says, that, of itself, temperature exerts no influence in the production of scrofula : it certainly is not a disease of either warm or cold latitudes, occurring chiefly in temperate climates.   At the same time he remarked, that in the hospitals of Paris, winter exercises a very unfavourable influence on those suffering from this disease ; that the ulcers suppurate more abundantly, the swellings become more numerous, and obstinate diarrhœa opposes the effects of anti-strumous medicines.   He does not admit, however, that this is owing to the change of temperature, but to the imperfect manner in which hospitals are heated and ventilated, thus causing those suffering under the disease to lie long in bed, by which means they inhale a vitiated atmosphere, and are deprived of proper exercise.   In confirmation of this view, of its not being owing to the climate of winter, he says that none of these ill effects are found to arise in cases where means are taken to guard against the immediate effects of cold.

If we view humidity as distinct from temperature, it cannot be said to be a source of this disease, for there are many districts where moisture greatly prevails, but which are not particularly characterized by the occurrence of scrofula.   We might name the departments of Comme, Boves, &c.   In this latter place, notwithstanding its being built in the midst of a morass, formed by the junction of two rivers intersected by three streams of water, and surrounded by canals and pools, so that fogs prevail to a great extent, in fact, presenting every condition of a humid climate, there are found but very few who are scrofulous ; while, on the other hand, it has been observed that the inhabitants of many places remarkable for dryness are particularly liable to this disease.

There can be no doubt, however, that temperature and moisture combined exert a considerable influence on health.   A temperate and moist climate presents that condition which, from its changeableness, is likely to be a source of disease generally, but especially of the disease under discussion.   At the same time the department of Picardy, where such a climate exists, is not prolific in cases of scrofula, excepting amongst those whose occupations confine them to their houses.   Baudelocque, to whose views we shall immediately refer, attributes its origin to the inhaling a vitiated air, and very ingeniously observes, that these climates induce the building of small and ill-ventilated houses— whence the disease ; that its absence is accounted for in warm climates by the inhabitants being chiefly in the open air ; and in cold latitudes by the great and effectual changing of the air, caused by the general use of fires in the rooms inhabited, so that the consequences of a vitiated atmosphere are avoided.

That a vitiated atmosphere exerts some influence in the production of scrofula, is an opinion that has been entertained by many.   Baudelocque devotes a large portion of his work to show that it is exclusively the exciting cause. " The occurrence of scrofula is always preceded by a residence, more or less prolonged, in an atmosphere which is not sufficiently renewed.   This cause is the only one to be met with, whether isolated or united to conditions whose action is only secondary."   (*Op. cit.* p. 264.)

Without taking so exclusive a view of the origin of this disease, many circumstances give much ground for supposing this cause very influential.   The poorer classes of large cities, who are frequently subjects of its ravages, noto-

riously live in rooms and situations which are not well ventilated ; and Riche-rand states that a considerable proportion of scrofulous cases which are ad-mitted to the Hôpital St. Louis come from those quarters of Paris where, from the height of the houses, and the crowded character of the district, there can be but a limited supply of fresh air ; and that at Troyes in Champagne, where many circumstances combine to make the atmosphere close, scrofula exists to a great extent. Baudelocque attributes the occurrence of the disease in the upper classes to the confined sleeping rooms they often occupy, the length of time passed in bed, and the not infrequent customs which children have, of sleeping with the head beneath the bed coverings, or deeply buried in a soft pillow.

At Bourg. St. Andeol it would appear that a vitiated atmosphere is the chief if not the sole, origin of the disease. The air, water, and food, are good ; its situation is healthful ; and there appears so little cause to account for its origin, that Madier is induced to attribute its frequent occurrence there to the presence of strangers. It is, however, stated that the streets are narrow, the houses high ; and that, besides these causes of a want of ventilation, the air is vitiated by the effluvia emanating from domestic animals, which they keep in courts attached to their houses, and from silk-worms, which are fed in great numbers within doors. Alibert observed that, at Mende, those work-men employed in the woollen manufactory and confined in close rooms are frequently afflicted ; while those in open shops enjoy an immunity. The same is observed by M. Regnault to be the case at Aubigny ; but the most conclu-sive fact in favour of this view occurred at a village called Oresmeaux, about nine miles from Amiens. It is situated in a large plain, exposed on all sides, and about one hundred feet above the level of the neighbouring valleys. The houses, built in the earth, lighted by one or two pieces of glass fixed into the walls, with floors some feet below the level of the soil, and low ceilings, were ill-ventilated in the extreme. Nearly all the inhabitants of this little village were afflicted with scrofula. A fire destroyed it ; it was rebuilt by houses of a more airy description ; since which time the disease has gradually subsided. It may now be said to have disappeared from that part of the country.

Prevention. There are three points to be particularly attended to in the prevention of scrofula :—1. Where a taint of the disease evidently exists in the mother, the state of her health during the period of utero-gestation should be regarded with the most jealous care. 2. That, on the birth of the child, if either parent should have strumous predisposition, prophylactic means must be resorted to during the early years of life. 3. In cases where there is no hereditary predisposition, but locality or other external agents appear the source of the disease, these must be obviated.

1. Females are not, for the most part, sufficiently impressed with the influ-ence exercised by their own state of health, during pregnancy, on the offspring they are carrying. This applies generally ; but when the system is imbued with disease, the fœtus is in a condition to receive any morbid impression much more easily. It would be useless here to lay down any series of rules. Particular stress, however, may be laid upon the necessity of sufficient cloth-ing, exercise in the open air, avoiding heated rooms and late hours, and ab-staining from an indulgence in a full stimulating diet.

On a child being born of strumous parents, every means should be taken as regards food, air, clothing, &c., to strengthen the general health, and to counteract the hereditary tendency. Should the father only be endued with the strumous habit, and the mother be in every way a proper person to nurse her own offspring, the infant should, by all means derive its nourishment from her in preference to a stranger. If, however, the mother, be scrofulous, a young healthy nurse should be substituted ; and for the first six or seven months the infant should be entirely nourished from the milk so afforded : in the succeeding three or four months, the addition of other light and nutritious food should be resorted to in addition to that of the breast.

It is absolutely necessary that the wet-nurse should not have given suck to her own child above a few weeks or rather days previous to the one she is to nurse : and during the whole period of her supplying milk, she, as well as the infant under her charge, should occupy large and airy rooms, and should take regular exercise in the open air, attending especially to the state of the digestive functions. A very common error prevails, that women, during the time they are fulfilling this function, should take in more nourishment than is their usual custom, and that it should be of a more stimulating and heating nature.

About the age of ten months, or at the latest twelve, the infant should be weaned. Nothing conduces so much to produce a feeble frame of body as protracting the period of nursing. The milk after twelve months becomes poor and innutritious, causing in the child fed with it flatulence and indigestion.

The food, at this period, should in great measure consist of cow's milk, together with light nutritious matters taken from the vegetable kingdom, with some very slight addition of broth. Dr. Paris strongly recommends milk impregnated with the fatty matter of mutton suet. It is prepared by enclosing the suet in a muslin bag, and then simmering it with milk. Where it is an object to introduce much nutritive matter in a small space, he is not acquainted with a better form of aliment. (*On Diet*, p. 220.) Dr. Cumin, who has made trial of it, fully bears out this recommendation ; and says that it has a near resemblance to goat's milk, but that it has the advantage of being more astringent. He found it to be very useful in cases of scrofulous marasmus, when almost every other article of diet caused irritation of the bowels, and passed through them undigested.

The clothing of infants is of great importance. Dr. Edwards has shown that they neither have the temperature of adult age, nor enjoy the power of generating heat to the same extent. The practical applications which result from his observations are of the highest importance. He says with great justice, that if the attentions which children require in climates and seasons little favourable to the preservation of their existence were generally understood and put in practice, it would considerably reduce one of the most powerful sources of mortality affecting that age in our climate. Cold operates much more generally than is supposed, and often affects the constitution most seriously, even when its effects are not manifested by any immediate sensations. " They do not feel the cold, but they have an uneasiness or an indisposition which arises from it; their constitution becomes deteriorated by passing through the alternations of health and disease ; and they sink under the action of an unknown cause. It is the more likely to be unknown, because the injurious effects of cold do not always manifest themselves during or immediately after its application. The changes are at first insensible : they increase by the repetition of the impression, or by its long duration ; and the constitution is altered without the effect being suspected." (Edwards, *op. cit.* p. 265.) In those countries where, from the degree of cold, its effects are more sensible than with us, the necessity of guarding their children against its influence is fully appreciated. The result is, that in these colder climates this agent is a less frequent cause of mortality than amongst us. At the same time that it is necessary to watch the progress of the seasons, and to guard against the injurious effects of their climate, it is also of consequence to promote that state of the system which is favourable to the generation of animal heat, in order to compensate for the abstraction of it by radiation, the temperature of our climate always making this a condition of our existence. This is effected by maintaining the organs of respiration and circulation in a state of vigour. The chief means which we have of promoting this are, exercise in the open air, living in apartments where ventilation is good, and the maintaining a healthy condition of the surface of the body. Immersion in cold water is useful to this end.

The importance of fresh air cannot be too strongly inculcated; the rooms occupied by those of a strumous tendency should be large, airy, well-ventilated, and not over inhabited: and of all things the child should not be confined in a cot or bed surrounded by curtains. The child of a country labourer, with every thing against him except that he enjoys fresh air, exhibits a vigour of health and appearance that is in vain looked for in those nurtured in the confined atmosphere of the nursery. Fresh air gives tone to the skin, vigour to the respiration, and conduces in great measure to a healthy state of the digestive organs.

As the infant advances to childhood, the same general rules are to be followed out. New faculties however come into play, whose progress should be watched with most jealous care. The developement and management of the mind requires a constant surveillance. Parents are too apt to be led into error by the precocity of mind inherent in many of this constitution; and in place of curbing it, they excite its developement at the expense of the bodily health. Nothing can be more injurious in the early years of life than that forced system of education which prevails in the present day: the head is developed at the expense of the body; and a child thus brought up presents the appearance of a weakly frame with a precocious intellect. Eventually however these hopes are disappointed, for that state of intellect which should only have been the accompaniment of after and mature years, fades into weakness and irresolution as manhood advances, that very period of life when the independence of intellect is required. A child with a scrofulous diathesis should learn its lessons in the fields, and not be bound down to books in the crowded atmosphere of a schoolroom. Amongst boys there is some relief and antidote to the disadvantages of the school system in the hours of exercise and free enjoyment both of body and mind when out of school. The whole period, however, of female school education is fraught with conditions the most obnoxious to the strumous constitution. Their rooms are generally confined and ill-ventilated, the use of stays, and bands, and strings, prevents the free exercise of the muscles. In school and out of school it is one system of drilling and exhausting attention, either to mental or external qualifications; and the natural positions of the body, which are occasionally assumed to relieve the exhaustion of constraint, are reproved as unseemly and unlady-like. Then again, the course of study is so copious and extensive, that the energies of the mind are weakened by a succession of ever varying impressions.

Another point to be attended to particularly is the state of the moral feelings. Should they naturally be excitable, control must be exercised, but of that quiet and unsuspecting kind as not to irritate and wound. Children at an early age are much more susceptible of moral impressions than is generally supposed. On the other hand, should the tone be of a morose or apathetic nature, means should be taken to excite them to cheerfulness and activity.

We have hitherto been speaking of those in whom the scrofulous constitution may be, *a priori*, supposed to exist from the condition of their parents. We must not however forget that the disease arises as it were spontaneously: the circumstances connected with its spontaneous origin should be diligently sought for, and if possible removed. They will generally be found attributable to locality and errors in construction of houses,—ill-ventilated damp houses and confined localities are much more frequently, than is supposed, fruitful sources of scrofula.

Treatment. Perhaps no disease requires greater exercise of that peculiar tact which should characterize the physician, than those which are tuberculous in their nature. The character of the inflammation which is attendant on the developement of tubercles rarely requires bleeding or purging, and the state of the constitution is such as generally to be injuriously acted on by a depletory course of treatment. Occasionally bloodletting may be sparingly employed on the advent of any decided inflammatory accession.

Strong purgatives are also particularly to be avoided. The observations of Louis on the frequency of tuberculous deposits in the membranes of the alimentary canal are sufficient to induce one to pause before their exhibition is resorted to. Independently of any local irritation they may be the means of exciting or setting up, their action upon the system generally is not beneficial: they tend to depress its powers, and derange its functions. Should alvine evacuants be required, which is very frequently the case, the safest and most convenient medicine to be administered is rhubarb with the addition of a little soda. We have also found the preserved walnut of great service to constitutions of this nature: it acts effectually, gently, and without leaving depressing results.

On the occurrence of any febrile accession, in preference to severe evacuants by blood-letting or purgatives, a saline treatment combined with antimonials should be resorted to. This has generally the effect of lowering the system sufficiently without tending permanently to weaken it.

Mercury in all its forms has been administered in cases of scrofula. Wiseman, Pearson, Curry, Carmichael, Lloyd, &c., have been strenuous advocates in favour of its administration. Others, however, if not condemning, do not recommend it. John Hunter, the great advocate of mercury in syphilis, does not mention its employment, and in fact we may infer from his observations, that he was opposed to its use, for he says the remedies must be directed both to the constitution and to the part affected: but, if we had a specific medicine, then attacking the constitution alone would be sufficient, as it is in the venereal disease (*Hunter's Works*, vol. i. p. 598), and in another place he states, as some of the evil effects of mercury (vol. ii. p. 432), the production of scrofulous enlargement of the glands, rheumatic pains in the limbs, or languid inflammations of the joints, having something of a scrofulous character. Cullen and Farre are decidedly opposed to its use. Cullen never found mercury in any shape of use in this disease, and that it is decidedly hurtful when any degree of feverishness had supervened. (*Pract. of Phys.* vol. ii. p. 272.) Dr. Thomson states that mercury has been used in every form of preparation, and in every variety of manner and dose. From the great apparent similarity of the symptoms, progress, and seats of scrofula to those of syphilis, and from the well-known effects of mercury in curing syphilis, it need not seem strange that medical men should have been a little obstinate in their attempts to obtain benefit from the use of mercury. These expectations are in general abandoned, and mercury is now given in the treatment of scrofula as a purgative only. A long-continued or improperly administered course of this medicine has often been known to aggravate all the symptoms of scrofula, and in many instances to excite them in persons in whom they did not previously exist. We have been particular in quoting these opinions, as they so entirely coincide with our own. We regard mercury in all its forms as a most injurious medicine in scrofula. Administered in small doses as an alterative, it frequently keeps up an irritation and excitement in the system which is eminently hurtful. As a purgative, independent of its specific effects, it is injurious, as belonging to the class of drastic medicines. (*On Inflammation*, p. 194.) Mr. Phillips, on the authority of Hufeland, Charmeil, &c., tried the black sulphuret; but at the same time he states that he found no sufficient reason to induce him to employ it generally, he yet prefers it to the common mercurials in use, stating its chief excellence to consist in its not producing the usual effects of mercury, nor otherwise manifesting any decided antiscrofulous virtue. (*Med. Gaz.* 1839, p. 814). A variety of other medicines have been resorted to in the cure of scrofula. The muriates of barytes and lime were some years since particularly recommended. Dr. Wood, the great advocate of the latter preparation, speaks of it as most valuable, safe, and effective. (*Edin. Med. and Surg. Journ.* vol. i. p. 147.) Other practitioners, however, have not found the same beneficial results, and it has gradually fallen into disuse. Lime-water, taken with milk to the extent of

half an ounce three or four times a day, we have seen in many cases of most eminent service, especially so in those of long standing, where gland after gland becomes the seat of abscess and ulcer. The muriate of barytes was proposed in 1784 as a remedy by Dr. Adair Crawford. (*Med. Comment.* vol. xiv. p. 433, and vol. xvi. p. 225.) Mr. Phillips speaks well of this medicine, and says that, with the exception of iodine, none seems to exert a more decided influence over scrofula. It usually increases the appetite, the secretions, and sometimes, like some of the forms of iodine, produces diarrhœa.

The liquor potassæ, so much recommended by Brandish, is occasionally of benefit, but by no means produces those uniform results its admirers led one to anticipate.

The carbonate of soda conjoined with a very small quantity of rhubarb, taken two or three times a day, is a very serviceable remedy. Ammonia has likewise been recommended, but of its continued use in this disease we have not made sufficient observation to speak decidedly of its merits. Dr. Cumin, on the authority of Dr. Charles Armstrong, says the carbonate has been administered in scrofulous cases with excellent results; but that its stimulant and diaphoretic properties render it suitable only for cases in which there exist torpor, languid circulation, impaired appetite, and a dry husky state of the skin, such as we often meet with among the poor, and in that form of the disease so well characterized by Alibert (*Nosologie Naturelle*) under the designation of *scrofule momie.* (*Cyc. Pract. Med.* vol. iii. p. 718.)

The whole class of tonic medicines have, in their turn, been recommended. Some of them are exceedingly valuable. We have frequently seen the emaciated frames of those worn down by this disease rally most surprisingly under the use of small doses of quinine and conium. The exhibition of quinine, however, requires to be carefully watched, as in some constitutions it sets up an irritation in the alimentary canal, which is not easily subdued. We have found it produce uneasy griping pain, followed by small irritating evacuations. The wine of iron is another tonic, which is often of essential service. The carbonate we have generally observed to be too stimulating, and apt to derange the digestive organs. Arsenic has also been recommended, and a recent writer speaks especially of its power in allaying the pains of scrofulously inflamed bones and joints. The probability, however, of its setting up an irritation in the muco-digestive passages should induce us to employ more safe tonics, unless in cases where the skin is affected by some of the eruptions which are proper to this constitution. In these cases, it is very remarkable how effectually it alleviates the morbid condition of the integuments.

Of the use of the ammoniacal muriate of copper we have no experience; it was recommended formerly by Helvetius and Stisser, and enjoyed great reputation under the name of the Liquor of Kœchlin. It has now, comparatively speaking, fallen into disuse.

The employment of acids is, at times, absolutely called for. During the progress of the disease the tendency to perspiration becomes so extreme that, if not controlled by their exhibition, great debility ensues. Their use at other times, as alteratives and provocatives to a healthy state of the system, is attended by very marked advantages. At the same time their exhibition should be narrowly watched, as, in many constitutions, they tend to set up alvine irritation, and, in others, produce constriction of the chest.

Occasionally local pains render it necessary to resort to sedatives. They should not, however, be used unless absolutely required, as they tend to derange billary secretions, and otherwise to deteriorate the state of the system. When employed, the least stimulating should be selected: as the belladonna, hyoscyamus, and the preparations of morphia. We prefer the hyoscyamus, as tending not to derange the bowels to the same degree as the others.

Of all the remedies, however, which have acted beneficially in this disease, none are to be compared with iodine and its compounds. This substance was

first discovered in 1812 by Courtois, and was recommended by Coindet of Geneva as a remedy for bronchocele. It is a powerful medicine, but if used in proper quantities is safe, and exceedingly efficacious. It fell somewhat into disuse, however, on account of some obnoxious qualities attributed to it, until, in 1829, M. Lugol brought it again into notice by that judicious employment of it, which has almost identified his name with its administration. The chief objections that have been urged against this remedy are, that it produces absorption of some of the larger glands of the body, causes general emaciation, produces pulmonary tubercles and hæmoptysis, induces palpitations, restlessness, fever, and irritation in the mucous membrane of the fauces and stomach, and, if continued for sufficient time, general dropsy. That these effects are not produced when judiciously employed, sufficient trial has been made to enable one to state most decidedly. The error in the administration of iodine, before the memoir of M. Lugol informed the profession upon the question, consisted in form and in too large doses. Given as he has advised it, the results show no ground for the statement of its injuriousness, and so far from emaciation being a consequence, the immediate effect of its exhibition is often observed to be, that thin females have acquired a state of *embonpoint*, together with a feeling of increased strength and improved health. In order to insure its efficacy, it should not, previously to its being required for use, be mixed with a large quantity of water. For the sake of convenience it may be kept in a concentrated form, and mingled with its menstruum, *guttatim*, at the time required to be taken. Lugol has shown that its certainty is much insured by being mixed with the hydriodate of potassa. We have found it convenient to adopt the following formula :*—R. Iodini gr x, Potassæ Hydriodatis gr xx, Aquæ ℨij. This makes an available and elegant preparation. From eight to twelve minims dropped into a glass of water, and taken three or four times a day, for an adult, has proved of the most signal service, and but rarely disagrees. There are certain states of the system which contraindicate its use, the chief of which, in females, is a tendency to menorrhagia. It sometimes, in women of a lax weak fibre, produces this morbid state. Neither must it be employed when any erysipelatous state of the skin exists, nor when pneumonia, gastro-enteric affections, or diarrhœa, are present. Its ostensible and almost immediate effects upon the system are, an improved appetite, a more transparent and healthy colour of the skin, together with a general amelioration of the symptoms, followed by a decrease in, and eventually an absorption of, the morbid glandular swellings.

On the use of this medicine being persevered in a very long time, some patients suddenly become feverish, affected by headache, and loss of appetite, &c. On remitting its employment, these symptoms soon subside. An excess of this state, which has been termed by Coindet and others iodic saturation, is characterized by acceleration of the pulse, palpitations, dry and frequent cough, night watchings, rapid thinning, loss of strength, trembling, &c. This condition of things should never be permitted to supervene. Baudelocque, whose employment of this remedy has been very extensive, affirms that he has never witnessed such a series of symptoms.

The statistical report of Baudelocque on the use of iodine is very satisfactory : of 67 cases of scrofula at the time of making his returns, 15 were cured, 14 were on the point of being declared well, 13 were in that state of progress which promised recovery, 5 had manifested some slight change for the better, and 20 were not benefited.

Very frequently, when it disagrees with the stomach, the hydriodate of potassa, administered by itself, or in conjunction with the decoction of sarsaparilla, is very useful. The other preparations of iodine taken internally are

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* The London Pharmacopœia directs that one ounce of iodine and two ounces of hydriodate of potassa should be dissolved in two pints of spirits, to form their tincture. We, however, prefer the aqueous solution.

the iodurets of zinc and iron : these are both very beneficial. The iodide of iron is a most valuable preparation in cases of dilapidated constitution, especially when worn down by the effects of superficial ulcerations : occasionally, however, patients in this condition are not capable of bearing the iron from its overheating the system, producing constriction of the chest and unpleasant feelings of fulness : we have then found the iodide of zinc a convenient substitute : the dose of either may be stated to be from about three to five grains three times a day.

The ioduret of lead, in the form of an ointment, applied externally either to simply swollen glands or to scrofulous abscesses or ulcerations, produces effects which are quite amazing when compared with the obstinacy of these conditions under other treatment. We have seen the most marked daily improvement follow its application in these cases, and may almost say have never been disappointed : it is bland, mild, and unirritating ; for which reason it is to be preferred to the ointments made with iodine or with the protoiodide of mercury, which produce, for some short time after application, sensations of heat, pricking, and burning. Baudelocque and Phillips, however, lay much stress upon the alternate use of these preparations, affirming that the tumefactions are only acted on by them for a short time after their first application. Our own observation has led us to conclude that the effect does not so speedily wear out.

Lugol is a strenuous advocate for applying iodine and its compounds in the form of baths. In this country we believe that this mode of application has not been much resorted to. We ourselves certainly have no experience of its employment in this form. Mr. Phillips does not approve of them, and states that in two cases where iodurated baths were prescribed by him, an extensive and troublesome eruption of the skin was produced, and in three others vertigo with a suffused countenance, which was not dissipated for some hours, while no sensibly good effects were produced upon the tumours. He does not state the strength of his baths, but the above effects call to mind the symptoms stated by Lugol as evidence in his experimental trials of the baths being too strong : and he particularly dwells upon the evils which result from employing iodurated baths prepared in stronger proportions than he has directed. The following tabular view of the proportions of iodine and hydriodate of potassa and water in baths for children and adults has been reduced from Lugol's formulæ to English measure by Dr. O'Shaughnessy :—

BATHS FOR CHILDREN.				BATHS FOR ADULTS.			
Age.	Water.	Iodine.	Hydriodate of Potassa.	Degree.	Water.	Iodine.	Hydriodate of Potassa.
	Quarts.	Grs. (Tr).	Grs. (Troy).		Quarts.	Drms. (Tr.)	Drms. (Tr).
4 to 7	36	30 to 36	60 to 72	1	200	2 to 2½	4 to 5
7—11	75	48—60—72	96—120—144	2	240	2—2½—3	4—5—6
11—14	125	72—96	144—192	3	300	3—3½	6—7

The patients were generally immersed in these baths for the space of half or three-quarters of an hour. The recommendation in their favour is fully borne out by the observations of Baudelocque, who in mentioning their remarkable effect on ulcerated surfaces, states, that on the individual coming from the bath, they appeared dried up, and as it were healed. In the course of the day, however, the surfaces again became moistened, and the secretion of pus which had been suspended reappeared, though in less quantity.

The author uses the word scrofula as synonymous with tuberculous disease. This is, no doubt, very nearly correct, but it requires some explanation. The term scrofula may be applied to

most disorders of a slow character tending to disorganization of the part, and not classed under different specific designations, as cancer, melanosis, gangrene, &c. These disorders tend sooner or later to the formation of tubercle, which is the anatomical character of the scrofulous disease, and may be secreted in every tissue of the body : but previous to the formation of tubercle a change takes place in the part, which is different from common inflammation, and may be properly termed scrofulous.

It is of course extremely difficult to explain the exact nature of scrofula ; the definition given of it by the author approaches, perhaps, as nearly as any other to the correct one. In most cases of tuberculous disorder there is evidently a peculiar constitutional state which is called the scrofulous, or consumptive, diathesis or tendency, but this is not always called into action. It is developed either by positive inflammation, or the gradual increase of the general disorder, which at last shows itself in particular organs, by a gradual alteration of the part, in most cases accompanied by the secretion of tuberculous matter. The nature of this alteration is difficult to define, other than that it is either a slow inflammatory action or a secretion of tuberculous matter not preceded by active excitement. In either case the nature of the alteration is so far specific that the disease is slow, does not readily tend to maturation, and is apt to recur in different parts of the body. The colour of the tissues is in general less red than in ordinary inflammation ; hence it has been said that the disease consists in an inflammation of the white blood-vessels, or lymphatics. It is very true that the red blood-vessels are not much involved, but the most distinctive character is not the colour of the part, but the secretion of the newly-formed matter, which either appears as ordinary tuberculous substance or as a white transparent infiltrated liquid. This in the bones produces caries, in the other organs either tubercles or slow alteration and thickening of the tissue.

The treatment, therefore, of scrofula is much more of a general than local character, and consists mainly in the use of such remedies as are capable of correcting the general diathesis, with occasional local treatment.

BRONCHOCELE.

THE term BRONCHOCELE (from βρογχος, the windpipe, and κηλη, a tumour) is applied to a morbid enlargement of the thyroid gland. This affection is endemic in every quarter of the world, particularly in mountainous districts. From its prevalence in some parts of Derbyshire, it is generally known in this country as the *Derbyshire Neck*. The Swiss call it *Goitre*, which is probably a corruption of *guttur*, throat. In most cases, the whole gland is uniformly affected with the disease, and forms a tumour in the front of the neck, often of an enormous size. Sometimes, however, the swelling is confined to the centre of the gland, or to either side.

At the commencement, the tumour has, in general, a firm elastic feel; but when it has existed a considerable time, it loses this character, and becomes soft and flabby, with hard knotty lumps distinguishable in its centre. Its growth is at first slow, but it afterwards advances rapidly in size, and extends in all directions, projecting beyond the boundaries of the chin and neck, and frequently becoming pendulous over the chest. Its appearance has often been compared to the dew-lap of the turkey-cock, and in many cases the resemblance is tolerably correct. In some instances the tumour is said to have reached the lower extremity of the sternum, and even to the knees. Dr. Broadbelt saw a case, where it was so large and flaccid, that the woman was in the habit of throwing it over her shoulder, to relieve herself from its distressing weight. Sometimes three distinct tumours are observed, corresponding to the three divisions of the thyroid gland. At others, one lobe only is affected, and, according to Alibert, the right is more frequently attacked than the left. The skin over the tumour retains its natural appearance, but large varicose veins ramify in all directions beneath. The swelling is unaccompanied by pain, and, in general, causes but little inconvenience. Sometimes, however, distressing and even dangerous symptoms are induced by the pressure of the gland on the surrounding parts. In this manner, the circulation through the cervical vessels may be impeded; or respiration and deglutition rendered painful and difficult by the compression of the trachea and œsophagus. These complications do not apparently depend so much on the size of the tumour as on the mode of its growth, being wholly absent in many cases where the gland has obtained an enormous magnitude; whilst in others the patient is harassed by them, even from the commencement of the swelling. The obstruction of the circulation is sometimes so great, as to occasion congestion of the brain, and apoplexy. In some instances, also, the pressure on the trachea has been so complete, as to cause death by suffocation. De Haen found this tube nearly obliterated in a case of this kind. In milder cases the respiration becomes habitually wheezing, and the voice shrill or hoarse. Not unfrequently, the patients complain of palpitation on slight exertion.

When goitrous tumours are examined internally, the following appearances are observed. The diseased gland is surrounded by a supernatural quan-

I doubt this.— have never seen it so. It is probably some other affection of the gland than goitre

tity of cellular membrane, thickened and condensed, which in some instances is so abundant, that it forms the chief bulk of the tumour. The gland itself is hypertrophied either uniformly or partially. Most commonly its whole substance is simultaneously affected ; but sometimes one of the lobes is enlarged, while the rest of the gland remains free from disease. When cut into, the diseased gland exhibits a cellular appearance. These cells are very various in size in the same gland : they are sometimes no larger than a pea ; whilst at others they form considerable cavities, which seem to be produced by the dilatation of the cells which enter into the natural structure of the gland. They contain morbid matter of various kinds, either fluid or solid. Sometimes it is perfectly aqueous, or more or less viscid and adhesive ; sometimes it has a gelatinous consistence ; at others, these depositions have a fatty, fibrous, cartilaginous, and, in some cases, even a bony character.

Causes. Numerous theories respecting the origin of bronchocele have at different times been advanced, which have fallen to the ground under the test of more extended experience. It has frequently happened that some accidental circumstance in its local history has been made the basis of doctrines respecting its origin which have been found inapplicable on a more general view of the disease.

With regard to its *predisposing cause*, there can be no question that women are far more liable to it than men : indeed, it rarely occurs in the latter sex in this country ; and even in localities where it is more particularly endemic, it is almost exclusively confined to females, except when connected with cretinism, to be presently noticed. It generally commences in infancy, between the ages of eight and twelve, and sometimes much earlier. In some instances it is said to be congenital. It frequently begins at the approach of puberty, the thyroid and mammary glands enlarging simultaneously and in some localities almost as certainly. A moderate fulness of the thyroid gland is by no means uncommon at that period in girls of this country, often exciting apprehension, but generally subsiding after a few months. The developement of the disease is often preceded or accompanied by uterine disturbance. (Copland's *Dict. of Pract. Med.* art. BRONCHOCELE.)

Women of the leucophlegmatic temperament seem to be more liable to it than others. It is a popular notion in some countries that the disease predominates in those who have long necks ; and girls of this conformation have, in consequence of this opinion, a difficulty in forming a matrimonial engagement.

The scrofulous diathesis has been considered by some to give a predisposition to bronchocele, which, however, is deficient in some of the essential characters of struma. The swelling is rarely preceded or accompanied by constitutional disturbance. There is little tendency to ulceration, the tumour continuing for many years in an indolent and inactive state. The lymphatic glands do not in general partake of the disease.

There seems more ground for the opinion of an hereditary predisposition to this disease. Certain families are observed, in districts where it is endemic, to be goitrous through successive generations. Dr. Crawford knew " a woman with goitre, whose grandmother, father, paternal aunt, and cousins also had it, although they did not all live in the same place, and no other person in their neighbourhood was affected with the disease." (*Cyc. Pract. Med.*) Similar facts have been mentioned by Fodéré and others. Indeed, in Switzerland, this tendency of the disease is a matter of common observation.

Great obscurity attends every step of the inquiry into the nature of the *exciting causes* of bronchocele, or the influences which occasion its appearance in certain localities as an endemic disease. This investigation may eventually lead to the discovery of important principles respecting the action of moral and physical conditions upon the growth and developement of organized beings. At present, however, our knowledge on this point is too limited and uncertain

to permit any safe or legitimate conclusions. In general terms it may be said that bronchocele fixes its abode in the deep, dark, and humid valleys of mountainous regions, which are filled with malarious exhalations, and where the atmosphere is seldom ruffled by a breeze of sufficient power to remove the accumulated poison. In Europe, it is a prevailing affection in the valleys of the Pyrenees, the Tyrol, and the Alps; and it is also met with among the mountain ranges of other parts of the world: generally speaking, too, the disease predominates in those localities where the agencies alluded to are in the greatest abundance. In Switzerland, it is most common in the Vallais, which of all the Alpine districts is the closest and worst ventilated. " Were this valley (says Dr. J. Johnson) beneath a tropical sun, it would be the seat of pestilence and death. As it is, the air must necessarily be bad; for the high ridges of mountains, which rise like walls on the north and south sides, prevent a free ventilation; while, in summer, a powerful sun beats down into the valley, rendering it a focus of heat, and extricating from vegetation and humidity a prodigious quantity of malaria."

It has been remarked by observers in goitrous districts in different parts of the world, that the disease disappears at a certain height above the level of the sea. Saussure found in his travels through Switzerland, that in a valley watered by the same stream, and where the habits and occupations of the inhabitants were precisely similar, those who lived in the upper portion of the valley were never attacked with the disease, which was endemic in the lower portion. He states, also, that goitrous patients, who removed from the latter to the former of these localities, were gradually disburdened of their complaint; while, on the contrary, it frequently attacked those who left the upper to reside in the lower parts of the valley. The investigations of Fodéré, and others, have led them to the same conclusion.

But, on the other hand, bronchocele is sometimes endemic in places of considerable elevation. Humboldt (Magendie, *Journ. de Physiol.* t. iii., p. 116) found it in Bogota, in South America, 6000 feet above the level of the sea. Mr. Bramley met with it among the Himalaya mountains at the height of 5000 feet; and upon the summit of a high mountain, forty-eight persons out of fifty-three were goitrous. (*Brit. and For. Med. Rev.* 1839.) Ramond, quoted by Dr. Crawford (*Cyc. of Pract. Med.*), observed both goitre and cretinism in the " open, well-watered, and well-ventilated valleys of the Pyrenees."

In some places, also, where all the ingredients for the production of malaria are present, bronchocele is unknown. It has often been observed to be less prevalent at the foot of a valley, where the miasmata must be supposed to be most concentrated, than its more open and elevated portions. Bronchocele, moreover, is not generally attended by any of the ordinary symptoms which are supposed to denote the action of malaria; on the contrary, goitrous persons are frequently robust and healthy. It may be doubted, therefore, whether this affection can be attributed to malaria in the ordinary acceptation of the term; that is, to the poison which induces remittent and intermittent diseases. At the same time it seems obviously dependent upon some deleterious quality of the atmosphere in places where it is endemic, not only attacking natives of those districts, but visiters who remain there for even a short time, although the greatest caution is observed in avoiding improper diet and other reputed sources of the disease; while by a removal from these localities goitrous swellings often disappear spontaneously.

Dr. Good supposed that bronchocele is the consequence of a diet deficient in nutriment, and attributed its prevalence in Derbyshire to the quantity of oaten cake employed there as an article of food. It is a common opinion in Switzerland that those who eat large quantities of chestnuts are very liable to the complaint. The wretched condition of the poor in the Vallais may, however, probably contribute to its prevalence there.

Goitre attacks indifferently the rich and the poor. We know an instance of

an English lady in affluent circumstances, who became affected with it after a residence of a few months in a goitrous district in Switzerland ; and many similar cases might be mentioned to prove, that the utmost care in the selection of diet does not remove the liability to the disease. Indeed, the rareness of its occurrence in the crowded parts of London is sufficient to prove, that misery, filth, and destitution, are not alone sufficient for its production.

The frequency of goitre in Alpine regions has given rise to the opinion (noticed by all authors on the subject since the time of Pliny) that it is caused by drinking the water from the glaciers or melted snow. Dr. Friend says, " The liquor, in going down, must needs chill the muscles of the throat. *i. e.*, it contracts the vessels, and thickens the humours which circulate through them, at the same time, from whence must flow a stagnation or obstruction, and, after a while, a swelling in those parts." (*Hist. of Phys.*, vol. ii., p. 146.)

It is now, however, well ascertained that the disease is endemic in warm latitudes where snow never falls, as China, India, Sumatra ; while in Lapland, Greenland, and some other northern regions, where melted snow is the common drink of the inhabitants, bronchocele is never seen.

It is curious that the converse of this opinion respecting the origin of goitre has been maintained by some modern observers. Fodéré remarked that it is less prevalent in the neighbourhood of glaciers which supply the villages with water, than in other parts of a goitrous valley. (*Traité sur le Goître et le Crétinisme.*) Captain Franklin states that at Edmonstone on the Saskatchanan river, where goitre is endemic, those persons who drink snow water entirely escape the disease ; but those who use the river water are almost universally attacked. (*Jour. of Voy. to the Polar Seas.*) These facts seem to favour the notion, which is a popular one in goitrous districts, that bronchocele originates in some deleterious quality of the water; indeed, it is impossible to examine the filthy beverage of some of these districts, without being convinced that pernicious consequences must ensue from its habitual use. Bally (*Dict. des Scien. Méd.*), a native of a district in Switzerland, where bronchocele is endemic, states that, in his country, those who drink the waters of certain fountains are almost always attacked, whilst others of the same village who avoid these waters are not liable to the complaint. Rombateau, also, considers that water impregnated with calcareous salts contributes to its developement. Dr. Coindet observed that almost every individual of a regiment who drank the calcareous water of the pumps at Geneva were attacked with goitre, which disappeared rapidly upon their removal to other quarters. Its prevalence in Nottingham is ascribed by Dr. Manson to the same cause. (*On the Effects of Iodine.*)

Mr. M'Clelland has lately made extensive researches into the causes of bronchocele among the Himalaya mountains. His inquiries extended over 1000 square miles, and he invariably found limestone rocks in the immediate neighbourhood of goitrous districts, while in villages where this stratification was not observed, the disease was rarely met with. When it was found in the latter places, Mr. M'Clelland could generally trace it to the use of water having its source in the limestone rocks, and where these waters were avoided, the complaint seldom appeared. Unfortunately, however, there are facts which prevent the universal application of this theory respecting the origin of the disease. 1. Bronchocele is met with abundantly in districts where there are no limestone rocks, as, for instance, in the Vallais. 2. It is absent in many places abounding in limestone formations. 3. It prevails in districts where the water is pure, and free from calcareous impregnations. (Humboldt, *op. cit.*) 4. A strict adherence to distilled water is not sufficient to ward off the disease in affected places.

The only way of reconciling these conflicting statements is, by supposing that the habitual drinking of calcareous waters strongly predisposes to bron-

chocele, and that there are other causes which have the same tendency, although few, to an equal degree. But the presence of some additional influence hitherto unknown, and probably of a more subtle and hidden nature, seems necessary for the developement of the disease.

Cretinism, to which we have before alluded, forms a most remarkable and interesting part of the history of bronchocele. The cretin—the most disgusting and hideous of beings possessing the human form—is found accompanying bronchocele in the Alps, the Pyrenees, the Himalaya mountains, and wherever the disease is abundantly endemic.

His stature is diminutive, seldom exceeding from four to five feet; the head is large, and the skull excessively thick; the countenance is vacant and void of intelligence, having in youth the aspect of old age; the eyes project and are widely separated : the eyelids are coarse and prominent; the nose wide and flattened; the tongue large and protruding, causing thick and babbling speech; the lips are thick, and the mouth large and drivelling; the skin is loose, wrinkled, and of a dirty-brown colour; the muscles are soft and flabby; the abdomen large and pendulous; the legs short and curved, occasioning the gait to be awkward and waddling; and a goitrous tumour occupies the neck.

This wretched deformity of body, is, in general, accompanied by a corresponding infirmity of mind. Idiotism of the very lowest grade is often the lot of the cretin. Sometimes even the external senses are absent; and the cretin is deaf, dumb and blind, with complete insensibility even to the demands of nature; more frequently, however, he is wholly governed by the animal propensities, being mischievous and lascivious, yet indolent and sluggish to an extreme degree. In some instances, however, he possesses a certain degree of intelligence scarcely inferior to that of the community among whom he dwells. A cretin of this class joined the writer and his party in the ascent of the Great St. Bernard. He was quiet and respectful, and answered questions coherently, so far as his imperfect articulation could be understood.

The connexion between bronchocele and cretinism is a subject well deserving attention, but on which our space will not allow more than a brief summary. 1. Cretinism is confined to districts where goitre is endemic. 2. Wherever cretinism prevails bronchocele is invariably found, but the latter is prevalent in districts where the former is never seen. 3. These affections seem to result from the same cause, but cretinism is not produced except in localities where the poison, on which they both depend, exists in the greatest activity. It is never seen, for instance, in the goitrous districts of this country, or in several of the more open goitrous valleys of Switzerland. It is comparatively rare in the better-ventilated parts of the Vallais; whilst in the gloomy valley of the Rhone it is so common as to give a character to the district. In accordance with the same rule, it has been observed that bronchocele and cretinism occur together in the deepest parts of a goitrous valley, but that the traces of the latter are lost beyond a certain altitude, where bronchocele continues endemic. 4. It has been supposed, when a family has been goitrous for two generations, that cretinism will appear in the third. It is also said, that when both parents are goitrous, their offspring will be cretins. But although these assertions may not be literally true, they convey the general impression of the inhabitants of affected districts as to the importance of intermarriage in removing the taint of cretinism; and the researches of M. Rambeteau tend to confirm the correctness of these views. He ascertained that those inhabitants of the Vallais who take their wives from places where neither cretinism nor bronchocele are endemic, have cretinous children far less frequently than those who marry females of their own valley, or other goitrous districts.

Diagnosis. Although the tumour of bronchocele is in general sufficiently characteristic, it may sometimes be confounded with other affections. The thyroid gland is liable to inflammation; but this disease may be distinguished from goitre, by the hard unyielding character of the swelling, by its being ac-

companied with redness of surface, increased heat and pain on pressure, by the suddenness of its appearance, by its not attaining the size of a goitrous tumour, and by its tendency to suppurate. The gland is sometimes affected with scirrhus. In this case, however, only a small portion is usually affected, which differs from bronchocele in its extreme hardness, and in being generally the seat of severe lancinating pain. In scirrhus, also, the swelling seldom attains a large size. Encysted tumours sometimes form in the course of the trachea, which may be distinguished from bronchocele by their situation, by their compact form, and by their giving a sense of fluctuation. Aneurism of the thyroid arteries may be known from goitre by the pulsation which accompanies the former affection, by the situation of the swelling, and by its diminishing or disappearing under firm pressure.

Treatment. The introduction of iodine as a therapeutic agent has nearly superseded all other remedies for bronchocele. This substance formed the active ingredient of several combinations that had previously obtained a reputation for the cure of this disease. The most remarkable of these was the burnt sponge, which has been successfully administered in many cases. It was principally used in the form of lozenge, and suffered to dissolve slowly and gradually in the mouth, a method supposed necessary to insure its good effects. The ashes of the fucus vesiculosus, called by Russell the vegetable æthiops, an empirical remedy named Le Poudre de Sensy, and some others, formerly favourite remedies for goitre, have also been found to contain a portion of iodine.

About six years after the discovery of iodine by Courtois, its presence was detected in burnt sponge by Dr. Straub of Berne. About the same time Dr. Coindet of Geneva, observing the similarity between burnt sponge and the ashes of the fucus vesiculosus, which was known to yield iodine, conceived that this substance might form the active principle of these medicines, and the idea occurred to both these gentlemen that iodine would prove an important remedy in the treatment of bronchocele. These views were immediately put into practical operation by Dr. Coindet with the most complete and gratifying success, for of 100 patients to whom the medicine was given two-thirds were cured. Since that period iodine has been extensively employed wherever bronchocele prevails, and its utility in this affection may be considered as fully and satisfactorily established. The formula employed by Coindet consisted of 40 grs. of iodine to an ounce of alcohol, of which from 10 to 20 drops were a dose. He also recommends an ointment composed of half a drachm of the hydriodate of potash to an ounce and a half of lard, of which a drachm is to be rubbed over the tumour night and morning. Dr. Marson of Nottingham cured 79, and greatly relieved 12, out of 120 cases. His preparation consists of 24 grs. of the hydriodate of potash dissolved in an ounce of distilled water, to be given in doses of 5 drops three times a day. Dr. Elliotson recommends a drachm of the iodide of potash to an ounce of distilled water, the dose at the commencement to be from 10 to 15 minims, and gradualy increased. Dr. Copland has found this remedy most efficacious in small and soluble doses, and has succeeded in curing some cases by this method, upon which large quantities of the remedy had made no impression.

As to the question whether this medicine is best employed internally or externally, it may be remarked that both methods may often be advantageously combined. Some patients, however, cannot bear even the smallest dose of the medicine taken into the stomach, who feel no inconvenience from its topical application. In either case, however, its effects should be carefully watched, and its exhibition suspended for a period, or its dose lowered, upon the manifestation of poisonous symptoms. Little benefit, however, may be expected from this or any other remedy unless regard be paid to other circumstances connected with the treatment. Whenever it is practicable, the patient should be removed from the goitrous district into some open and elevated situation. Numerous instances are recorded where the adoption of this change was followed

by a rapid subsidence of the disease. Where the patient is plethoric, the exhibition of iodine may be properly premised by general bleeding. The application of leeches to the swelling is often useful to diminish any inordinate irritation—an accident which not uncommonly occurs during the exhibition of iodine,—and they may also assist in the reduction of the swelling.

If there should be symptoms denoting derangement of the digestive organs, a course of alterative medicine should be commenced and presevered with until their healthy action is restored.

When the uterine functions are unduly performed, which is often the case in bronchocele, emmenagogue remedies should be prescribed.

Other remedies were formerly used in the treatment of goitre, which are now seldom employed : of these the principal are digitalis, belladonna, conium, muriate of barytes, muriate of lime, calcined egg-shells, sulphuret of potash, mercurial preparations, &c. As external applications, it was the practice to employ repeated blisters, stimulating plasters of ammoniacum and mercury, or cicuta and ammoniacum, stimulating or opiate liniments, caustic applications, &c.

When the tumour of bronchocele occasions great inconvenience by its pressure on the trachea or œsophagus, and the ordinary means of relief have failed, a cure has been attempted by means of a surgical operation. (See Cooper's *Surg. Dict.*, art. BRONCHOCELE.)

Several cases are recorded where the tumour was reduced by the introduction of setons into the diseased gland. This method appears to have been practised in the middle of the last century, but was not generally known until Dr. Quadre of Naples published some cases in which it had been employed with success. It was afterwards adopted with benefit by Mr. Copland, Hutchinson, and others. The objections to its use are, that it is sometimes attended with dangerous hæmorrhage, or by extensive suppuration of the gland. There is also danger of the communication of the inflammation to the trachea and larynx.

In some instances the operation of tying the thyroid arteries has been practised. It was first attempted by Sir W. Blizard, with the effect of reducing the size of the tumour one-third. The ligatures subsequently sloughed off, considerable hæmorrhage ensued, and the patient finally sunk from hospital gangrene. In 1814 this experiment was repeated by Walther of Landshut. He first placed a ligature on the left superior thyroid artery, which in a short time occasioned a diminution of the gland on that side to one-third its original size. He then tied the artery on the opposite side, which was followed by wasting of the tumour on the corresponding side, but not to the same extent as in the previous operation. The patient, who had suffered from dyspnœa in consequence of obstruction of the windpipe, was greatly relieved, and continued well two years after the operation. Mr. Coates of Salisbury also tied the left superior thyroid artery in bronchocele with urgent symptoms. The swelling diminished to nearly one-half its former dimensions, and the patient left the hospital in good health. In the subsequent history of this case, however, communicated by Mr. Coates to Dr. Crawford (*Cyc. Pract. Med.*), it appears that, after continuing well for some time subsequent to her discharge from the hospital, the tumour gradually returned, and at length occasioned death by suffocation. A case very similar to that of Mr. Coates is given by Dr. Crawford from the notes of Mr. Wickham of Winchester. The tumour was diminished by the operation ; but after six weeks it began to return, and shortly regained its former size. "It seemed (says Mr. Wickham) that the decrease of the tumour continued so long as the part of the gland, which had been supplied by the vessel, remained without nourishment, but as soon as the supply was restored by the anastomosing branches from the opposite superior thyroideal arteries, the swelling returned to its former dimensions."

Some surgeons have effected the complete extirpation of the gland. Desault is said to have removed a portion of it successfully, but from the description of

his case, it appears to have been more allied to scirrhus than to bronchocele. Mr. Gooch (*Med. and Chir. Obs.*) attempted the excision of the gland in two instances. In the first, the hæmorrhage was so alarming that he was obliged to relinquish the operation, and the patient sunk from exhaustion. In the other case, the bleeding was also excessive, and could only be arrested by the pressure of the hand on the part, which was kept up by a succession of persons for a whole week. Dupuytren completed this operation, and although the patient only lost a small quantity of blood, death ensued in thirty hours.

The operation has sometimes, however, been followed by happier results. Dr. Hedenus of Dresden has performed it six times with success, and a few other similar instances might be mentioned. But it is always attended with great hazard, and is hardly justifiable, except where the patient is threatened with immediate destruction from the pressure of the tumour.

R H E U M A T I S M.

THE word *Rheumatism*, like its kindred term *gout*, is the offspring of the humoral school of pathology. Its literal signification is " fluxion," and it is primitively derived from the Greek word " ρεω," to flow ; " ρευμα," a fluxion.

Rheumatism has always deservedly engaged the attention of English physicians, on account of its great frequency in our climate, its painful and protracted course, and the baneful evils which often follow in its train. Of late years, additional interest has been attached to its study, by the discovery that, in the acute form, it often fixes on the fibro-serous textures of the heart, and causes changes in their structure which interfere with the functions of that vital organ. Many have laid claim to the merit of this discovery, and M. Bouillaud, in particular, has been loud in his pretensions ; but it appears that Dr. Pitcairn first noticed this fact, and pointed it out to his pupils at St. Bartholomew's, as early as 1788. In November, 1808, Sir D. Dundas read a paper on the subject before the Medico-Chirurgical Society.

In that paper rheumatism of the heart was considered in its true character, and described as occurring, not by metastasis, but at various periods in the course of the malady. By reference to morbid anatomy, Sir D. Dundas showed that the internal membrane of the heart was liable to be affected, as well as the pericardium. Subsequently, Dr. Wells and Dr. Odier of Geneva made some important observations on this subject. It is, then, certain, that the true connexion between disease of the heart and acute rheumatism was observed long ago by British physicians, and that they did as much for its history as could be expected without the help of auscultation. The extreme frequency of rheumatism of the heart was not known to them, because their diagnosis of it was imperfect. Since Laennec's discoveries British physicians have continued to improve their knowledge of this affection : its great frequency has been recognised, and its seat and morbid effects well ascertained.

Rheumatism affects two forms, the *acute* and the *chronic*.

Acute Rheumatism. Persons from fifteen to thirty years of age are the most subject to acute rheumatism : in old persons and in children it is comparatively rare : the latter are not, however, so generally exempt from this disease as they are from gout, for instances of acute rheumatism in children are by no means uncommon. The first symptom of the malady is, in the great majority of cases, severe pain of the insteps and ankles, which is sometimes, but not always attended with shivering. When the attack is sudden, as generally happens, the affected parts become, in the course of a few hours, uniformly swollen, tense,

and elastic, and soon afterwards the integument is suffused with a bright rose-coloured blush, mostly in patches, the neighbouring cutaneous veins being at the same time turgid. The tense and elastic condition of the parts soon gives place to a flaccid and puffy state, and while this change takes place the pain abates. The knees are attacked soon after the ankles; the affected limbs are immediately and completely disabled, so that in many cases the patient is obliged to be helped to his bed soon after the accession of the first symptoms: the slightest motion of the rheumatic limbs occasions excruciating pain. The upper extremities become next affected, and the patient is thereby rendered incapable of movement; a circumstance which causes a peculiar and characteristic posture. Fever comes on with or soon after the local symptoms, and increases with them; it is attended with profuse sweating when the pain is severe, and this sweating, far from giving relief, is more profuse as the pain increases. The pain is in most cases aggravated by warmth, and usually much more severe at night than by day: the fever, too, is much greater at night, when the patient's linen is often drenched with perspiration which has a sour and pungent odour. During the day there is also considerable fever; the face is flushed; the pulse, which is seldom less than 90 and sometimes reaches 120, is hard and full: there is loss of appetite; urgent thirst; and the urine, scanty and high-coloured, deposits, on cooling, an abundant brick-coloured sediment. The patient remains in this state until nearly all the joints of the extremities have become affected in their fibrous textures; tendons and sheaths of muscles likewise suffer, and effusion takes place into the cellular tissue and synovial capsules in contiguity with these several structures. The affection of each part does not usually continue during the whole course of the disease; after a certain period it subsides, but generally returns at least once. The number of parts affected at the same time is considerable, and, with few exceptions, much greater than in gout.

About the end of the first fortnight there is generally some amendment: the pain lessens, especially at night; and there is corresponding abatement of fever, and diminution of perspiration. At the same time the urine becomes more abundant, and less charged with deposit; appetite returns, and thirst diminishes, while the pulse falls to nearly its natural standard; the movements also are more free, and the patient varies his posture. The course of this amendment is however often interrupted by exacerbations, and convalescence is not in general confirmed until the middle or end of the fourth week. In some rare instances, convalescence appears as early as the second week, but is more frequently deferred to the sixth week, or a still later period. In an average, drawn from a considerable number of cases, we found the duration nearly one-fourth greater in first than in subsequent attacks. We have stated that, at the height of the malady, effusion takes place from the affected parts. The appearances differ according as the fluid is effused into cellular tissue or into the definite cavities of synovial capsules: in the former case the part is puffy, and, in some rare instances, œdematous, as on the wrists and insteps; in the latter, fluctuation may be perceived with tense swelling, in form of the capsule, tendinous sheath, or bursa.

The characters last mentioned are most obvious in the knees, because effusion into the capsules of those joints is either conspicuous, or at any rate easy of detection. As effusion proceeds the pain abates, unless the quantity of fluid poured out be sufficient to occasion much distension.

It has been stated that each part does not continue to be affected in this way through the whole course of the disease, but that the individual affection subsides, and generally returns at least once. Each of these attacks of a given part occupies a period varying from three to fourteen days. The circumstance that effusions into synovial capsules are more general in some cases than in others, has led many to suppose an essential difference between such cases, which have accordingly been distinguished by the epithets *fibrous* and *synovial*: it has even been alleged that the heart, if not entirely safe, is much less

liable to be affected in synovial rheumatism; and further, that these two forms
require entirely different treatment. We are of opinion that they are identical
in nature; that the fibrous tissue is primarily affected in both, whether the con-
secutive effusion take place into cellular tissue or into a synovial capsule: and
in almost all those cases, called *fibrous* rheumatism by authors, we can from
observation affirm that effusion does take place into the capsules of the knees at
least. We have elsewhere shown that the heart is equally liable to be affected
in both cases.

On the approach of convalescence, when recovery is to be complete, the fluid
effused in different parts is rapidly absorbed, and the joints regain their natural
form and usual freedom of motion. They continue weak, however, for some
time, and are occasionally painful at night. In less favourable cases the fluid
effused in the synovial capsules does not become absorbed, and the ligaments
continue in a thickened state; the functions of the joints are thereby much im-
paired, and disposed to be still further altered by chronic rheumatism, which is
the common sequel. Effusions become permanent in the small joints of the
hands and feet, oftener than in any others; the synovial sheaths of the tendons
of the fingers are also very liable to the same condition, and their course is then
marked out by ridges on the palm and back of the hand.

Such are the course and characters of acute rheumatism when affecting
external parts; but in a large proportion of cases there comes on at some period
of the disease another group of symptoms. These are, chiefly, sudden pain in
the præcordial region, and palpitation, attended with difficulty of breathing and
sense of oppression. The appearance of these symptoms indicates, pretty surely,
that the heart has become affected with rheumatic inflammation; whether the
internal membrane or the pericardium be its seat, can be determined only by
auscultation and careful examination of the chest, for the general symptoms are
alike in both cases. The præcordial pain sometimes extends to the left hypo-
chondrium, is generally increased by pressure in the intercostal spaces, by inspi-
ration, and by lying on the left side. The difficulty of breathing is often consi-
derable, and there is usually a slight increase in the frequency of the pulse,
which, with rare exceptions, maintains its regularity.

These symptoms usually lose much of their severity in the course of the
twenty-four hours which follow their accession; the dyspnœa and oppression
are alleviated; the palpitation and pain remit, and subsequently occur only when
the patient coughs, or, if at other times, for very short intervals. After this
period there is seldom any thing very alarming in the general symptoms; often,
the patient is tranquil, and unembarrassed in manner, and nowise suspects that
he is affected with disease of a vital organ. This freedom from suffering is
observed even when there is considerable effusion into the pericardium, and
sufficiently explains the fact, that rheumatic inflammation of the heart so long
escaped the notice of physicians.

The symptoms above described are sometimes so slight, even at their onset,
that they are not complained of, and it is only by inquiry that their occurrence
is ascertained. In some cases (of pericarditis especially), the only indication
that rheumatism has become extended to the heart is a singularity of manner
and waywardness, which are characteristic, and easily recognised by those who
have once witnessed them. Taciturnity and a look of listlessness are often the
most striking characters of this state of mind, which is not one of active delirium.
If the patient is narrowly watched it will be generally found, also, that the
breathing is much quicker than natural, for difficulty of breathing is one of the
most constant of the symptoms of rheumatism of the heart. Indeed, the breathing
appears to be more affected than the pulse in these cases, as regards frequency
at least.

Although acute rheumatism of the heart often lays the foundation of future
irreparable mischief, it is not often immediately fatal; the instances of death

occurring in the acute stage being chiefly in persons of weak or broken consti-
tution.

If the chest be carefully examined some hours after the onset of the affection,
various important circumstances are observed. Abnormal sounds attend the
heart's action, and these vary in character according as the seat of rheumatic
inflammation is in the pericardium, or in the lining membrane of the heart.

In the latter case the morbid sound is some modification of " bruit de rape,"
or of bellows-sound, and attend the heart's systole or diastole, or both. In
twenty-three cases of rheumatic endocarditis which were observed with much
attention, the different conditions of this sound as regards time and situation
were carefully noted, and the following circumstances remarked:—In all but
three, this sound was loudest at that point of the præcordia where the heart's
impulse was felt, and was also much louder in the left præcordial region than
in the right, where often the sounds of the heart were quite natural. The sound
attended the diastole in one case only; in all the others the systolic sound
was exclusively altered. At the point of impulse, however, the diastolic sound
was quite inaudible, and seemed to be involved in a prolongation of the systolic.
From these facts, we must infer that the morbid sound originated principally,
and often exclusively in the left cavities of the heart, and was most probably
produced by a morbid condition of the aortic valves. The first inference accords
well with what we know of the pathology of the valvular apparatus of the left
side of the heart, which, from being more tendinous in structure than that of the
right side, is more subject than the latter to rheumatic inflammation. It is easy
to show why, under common circumstances, a morbid sound, proceeding from
the aortic valves, should be louder at the point of impulse than elsewhere; for,
since the systole and impulse are exactly synchronous, the point of the left
ventricle is thrown into firm contact with the walls of the chest at the very
moment the sound is produced; thus establishing, between the origin of the
sound and the ear of the observer, a more direct and more *uniform* medium of
communication than can be found at any other point of the præcordia. At that
point, also, there is in many cases a palpable vibration (*frémissement cataire*),
which sometimes indicates the character of the sound in a most remarkable
manner.

We have stated that this morbid sound affected the diastole in one case only
of the twenty-three referred to; this fact admits of the following explanation.
At the moment of diastole the heart has ceased to be in firm contact with the
walls of the chest, so that the condition, which is so favourable to the transmis-
sion of systolic sounds, no longer exists; to this circumstance, and to the greater
remoteness of the mitral valve from the surface, must be ascribed the rare
occurrence of abnormal diastolic sounds in acute rheumatism. The mitral
valve is, without doubt, quite as often affected with rheumatic inflammation as
the aortic valves, for it is more tendinous in structure, and in the aggregate of
valvular diseases is oftener affected. The plain inference from these facts is,
that it is possible for rheumatic inflammation of the lining membrane to exist,
without altering the sounds of the heart at all; and it would therefore be pru-
dent, when marked general symptoms of the affection appear, to adopt the same
remedial measures as if no doubt of its reality existed. We have never known
the morbid sound in question entirely cease after it had once come on, but in
most cases a change in its character takes place as febrile excitement subsides,
and convalescence approaches; at first generally harsh, and sometimes a true
" bruit de rape," it gradually loses this quality of harshness, and acquires the
pure bellows-tone, while at the same time it diminishes in loudness; thus
illustrating Laennec's remark, that these are merely modifications of the same
sound. These changes are mainly owing to diminished rapidity of the cir-
culation, for when that function becomes temporarily accelerated by exercise,
the former character of the sound in great measure returns. It is in those

cases, in which the quality of the sound is very harsh, that a palpable vibration is remarked.

These are the circumstances observed in a careful examination of the chest, in the common course of rheumatic inflammation of the valvular apparatus of the heart. We have dwelt at some length on the subject of the morbid sound, because some writers of authority, and especially M. Chomel, have lately endeavoured to depreciate its value as a sign of the affection under consideration; but the circumstances, detailed in connexion with this sound, leave no doubt of its real value as a symptom.

When the pericardium has become the seat of rheumatic inflammation, the local signs, observed in auscultation and examination of the chest, differ in character from those just described, and denote the effusion of lymph and serum from the inflamed membrane. The principal of these signs are, dulness on percussion in the præcordial region; prominence of that region, so that the intercostal furrows are effaced; and a rubbing sound attending the heart's action—or, when the effusion is very abundant, diminished clearness of the heart's natural sounds, which seem remote and stifled.* We have never seen an example of rheumatic pericarditis in which the rubbing sound was wanting, but have known many of idiopathic pericarditis in which it was not observed: we have reason, therefore, for believing that it is more frequent in the rheumatic than in the idiopathic form of pericarditis; a circumstance which indicates some difference in the quality or quantity of the effused fluid in the two varieties. The fluid seems to be, generally speaking, less abundant in rheumatic than in common pericarditis, the increased dulness on percussion being, as far as we have observed, less extensive. These circumstances give additional value to the rubbing sound as a sign of rheumatic pericarditis. The period during which the physical signs continue varies much in different cases, and depends on the rapidity with which the affection proceeds towards a favourable or fatal termination. In one case which fell under our notice the rubbing sound continued during two days only, and was almost the only physical sign of the affection, for the fluid effused was not in sufficient quantity to occasion extensive dulness, or alter the form of the præcordial region. The general symptoms of the affection had already subsided before the sound ceased, so that its cessation undoubtedly marked the completion of cure by adhesion. In most cases, however, this sound lasts from a week to a fortnight, but as the curative process advances gradually becomes less loud and more limited, and at length ceases altogether; an event which probably denotes adhesion between the surfaces of the pericardium. While this change is taking place the extent of dulness on percussion diminishes, and the natural form of the præcordia is in great measure restored. But the general symptoms of the affection have usually subsided long before these physical signs disappear, so that patients are often at a loss to know why the physician continues to examine the region of the heart with so much attention. Cases do occur, however, in which rheumatic pericarditis terminates fatally, and in these the symptoms have exactly the same progress and character as in fatal pericarditis from other causes.

The physical signs mentioned as characteristic of pericarditis are never observed in simple endocarditis, but in all the cases of rheumatic pericarditis which we have seen, endocarditis was also present, and was distinguished by its usual physical signs. In some cases these existed before pericarditis came on; and in all, they continued after the proper signs of that affection had ceased. In some, the "bruit de rape," which had come on first, and which characterized the deeper affection, could be heard, as it were, through the rubbing sound of the pericardium: from this it appears that rheumatic inflammation of the pericardium is less frequent than that of the valves of the heart. In twenty-one cases of acute rheumatism affecting the heart, which were taken

* For the physical explanation of these signs we refer to the article PERICARDITIS.

indiscriminately, and whose history was written with exactness, there were five only of pericarditis, and in all these the lining membrane was also affected. We shall presently show that the remote effects of the deeper affection are also much more serious than pericarditis.

Pleurisy very often complicates rheumatic pericarditis : it existed in three of the five cases just referred to ; and since the period at which these five were observed we have seen five other instances of the same complication. In all these, the pleurisy was on the left side (double in one case) ; and where the order of succession of these affections was observed, pericarditis had the priority. These are the only examples we have seen of pleurisy occurring in the course of acute rheumatism. We infer, from the circumstances mentioned, that in those cases the pleurisy was not of rheumatic origin, but a simple inflammation, excited by the pericarditis which previously existed. This inference is strengthened by another order of facts : we have lately seen three examples of idiopathic pericarditis, and in all three pleurisy supervened—single, and on the left side, in two cases ; double in a third. In the last,.which proved fatal, the priority of pericarditis was evident from inspection of the alteration, which was much more advanced in the pericardium than in the pleura. We do not however deny the possibility of rheumatic inflammation of the pleura. M. Chomel states (*Leçons Cliniques sur le Rheumatisme et la Goutte*) that he has seen pleurisy come on at least as often as pericarditis in acute rheumatism. He does not however relate any example of it ; and if he speaks of pleurisy unconnected with pericarditis, his experience differs very widely from our own.

We have stated that the symptoms which characterize rheumatic inflammation of the heart come on in a large proportion of cases of acute rheumatism : of forty-three cases of which we have preserved accurate notes, these symptoms were present, and quite unequivocal in twenty-one, five of which were examples of pericarditis. This accords pretty well with the experience of M. Bouillaud, who however raises the frequency of these affections to a still higher standard, and states that they occur in the great majority of cases of acute rheumatism. The great frequency of these affections is well known to hospital physicians in London, where acute rheumatism is very prevalent.

In the publication already referred to, M. Chomel has not only denied that affections of the heart are common in acute rheumatism, but states that they occur only in rare and exceptional cases : but as he sets out with avowing his belief that gout and rheumatism are identical, his inferences as to the affections in question are all vitiated by the consequences of that belief. His arguments, grounded on the alleged insufficiency of the signs, generally considered to characterize these affections, have already been adverted to.

The period at which the cardiac disease comes on varies, according to our observation, from the eighth to the twenty-seventh day. In general, it may be said to come on when the disorder is at its height, but we have seen one instance in which it was highly probable that pericarditis came on as early as the first day of illness. When the heart becomes affected the rheumatism of the joints does not subside, but continues as before : the fibro-serous textures of that organ do not become affected by *metastasis* from the joints, nor must their affection be considered as accidental, but as one of a series of local affections which implicate identical tissues in various parts of the body. There is no doubt that affection of the heart is most frequent in severe cases, as may be partly inferred from the following statement :—Of twenty-six patients, in whom rheumatism occurred for the first time, the heart became affected in sixteen, or nearly two-thirds; but in five only of seventeen, in whom it had occurred once before or oftener ; so that rheumatism of the heart was more than twice as frequent in the first as in the second series, and we have already seen that acute rheumatism is more severe in the first than in subsequent attacks.

This part of our subject would be incomplete if we did not point out in

general terms the more remote sequel of these rheumatic affections of the heart. It is beyond doubt that the remote effects of endocarditis are much more serious than those of pericarditis ; for, when the latter terminates in cure by adhesion, the impediment which results to the functions of the heart is slight, and the consecutive change of structure in that organ is seldom considerable. We have seen a great number of cases of adhesion of the pericardium (often general) of long standing, in which the heart was in all other respects natural, and its functions during life perfectly performed. The consequences of endocarditis are very different. It will be seen in our remarks on the pathology of rheumatism, that the immediate effects of endocarditis are, to narrow the orifices at which the valves are placed, to impair the action of those valves by means of adhesions or by destroying their elasticity, and to substitute, for the naturally smooth surface over which the blood flows, a rough membrane, which, on the valves themselves, is often beset with vegetations. These different alterations have one common effect, which is *obstacle* to the course of the blood ; and the necessary consequence of that obstacle is, distension of those cavities which are situated behind it in the course of the circulation. The heart labours in the discharge of its functions, and, by the operation of a general physiological law, its nutrition is promoted, and hypertrophy the consequence. The dilatation and hypertrophy increase, because the original obstacle remains, or perhaps increases, and because dilatation itself is a further cause of obstacle ; for the force required to empty a cavity through a given orifice is greater as the capacity of the cavity increases. At length the deviation from the natural structure of the heart becomes very great, and its functions suffer in proportion : all the distressing symptoms of advanced disease of the heart supervene, and sooner or later terminate in fatal dropsy. These deplorable effects follow with greater certainty and in shorter time, in proportion as the obstacle is greater which is offered to the course of the blood by the original morbid alteration of the lining membrane. It would be interesting therefore, as regards prognosis, if we could appreciate at an early period the degree of this obstacle. Laennec has remarked that " frémissement cataire," or purring tremour, is generally a sign of " notable" obstacle at the orifice in which it originates. Our experience confirms his statement. A lad, in whom this tremour was observed in a very marked degree when the valvular affection was only of a fortnight's date, was obliged to seek medical relief, a few months afterwards, for distressing symptoms of disease of the heart.

It is not ascertained whether or not the rheumatic affection of the valves may continue in a chronic form like that of the joints, or whether it be affected by the same circumstances. We are convinced, however, that the morbid alteration of the valvular apparatus increases in the course of time, although no fresh attack of acute rheumatism should occur. It is rational, therefore, to attribute the temporary præcordial pains, and other passing local symptoms which these patients occasionally experience, to slight returns of rheumatic affection of the valves. This is also a desirable conclusion as regards treatment.

In many cases of acute rheumatism symptoms of arachnitis come on, and lead rapidly to a fatal termination. In all the instances of this affection on record the heart likewise was affected. We have seen one case of recovery from this cerebral affection.

Diagnosis. Gout is the only disease which can be readily confounded with acute rheumatism. For a statement of the means of diagnosis between them, we refer to GOUT.

Pathology. In the description of the symptoms of acute rheumatism, it is stated that morbid effusions into the cavities of synovial capsules and serous membranes may be detected during life ; we might thence be led to consider the membranes which enclose these cavities as the seat of the affection ; but tissues of this kind do not enter into the composition of all parts that become affected with acute rheumatism ; whereas there is one element which is never wanting,

namely, the fibrous tissue : it is this tissue which is the primary seat of the local affection ; the synovial capsules and bursæ, the serous membranes, and the lining membranes of the heart become affected secondarily, and only by reason of their intimate connexion with the fibrous tissues which support them.   This point, once established, will materially assist us in our inquiry into the character of the local affection ; a question which has long been, and continues to be, a subject of warm debate with pathologists.   In this inquiry we must not limit our attention to the effects of acute rheumatism on the joints (for that would give only a partial view of the subject), but also study them in those organs in which the fibrous tissue is invested with a serous membrane.   There can be no doubt that the rheumatism of the fibrous tissue in these different situations is quite identical, and it therefore follows, that what is true regarding it in one situation holds good in another.   The character of the local affection can thus be best determined by studying its effects in those situations in which serous membranes become implicated; for the true import of lesions of those membranes is well known, and pathologists are of one mind respecting them.   The lesions which acute rheumatism produces in these membranes prove the inflammatory nature of the affection, for it is impossible, by simple inspection after death, to discriminate between the appearance of common and of rheumatic pericarditis ; serous effusion, false membranes, and sometimes pus, are present in both cases. On the lining membrane of the heart the evidence of inflammation are equally decisive.   It is superfluous, therefore, to refer to the symptoms during life in corroboration of this view.

The opportunities of examining, after death, joints which have been recently affected with acute rheumatism, are extremely rare : there is some discrepancy in the few accounts of their condition which have been given by authors.   In one instance of well-marked acute rheumatism, the course of which was cut short by fatal cholera, we found shreds of false membrane adhering to the synovial capsules of both knees.   M. Chomel has described the joints of a person who died two or three days after cessation of the local affection in acute rheumatism : in one knee there was slight excess of synovia, which was viscous and semitransparent, but the interior of all the joints examined was white and smooth.

The formation of false membranes in synovial capsules in acute rheumatism is perhaps not a common case, but we should not thence conclude that the affection of the joints is different in its nature from that of the fibro-serous parts, but that synovial are less apt than serous membranes to the formation of these peculiar morbid products.   It is, then, our firm conviction, that the local affection in acute rheumatism is identical in all the parts it visits, and that its inflammatory character is as real in the joints as in the fibro-serous membranes.   We have seen that during life the affection of the joints is attended with severe pain, local redness, swelling, and effusion of fluid ; that much fever accompanies these local symptoms ; and, that when blood is drawn it is always buffed and cupped ; all which circumstances bear out what has been stated of the nature of the local affection.

We have already shown, also, that the affection is found, on attentive inquiry, to be much less shifting than is generally supposed, and that its usual duration in individual parts is ten days, and sometimes fourteen or more.   We do not, however, argue, that the local affection is common inflammation, but that inflammation is an important element in its pathology, and the agent which injures the structure of the joints, by producing false membranes and permanent effusions in their cavities, and external thickening of their fibrous tissues ; alterations which impede their movements, and tend to prolong rheumatism in a chronic form.   The character of the local affection is not, therefore, an idle question.   The agency of inflammation in acute rheumatism of the heart is too obvious to require further comment, but even in that organ it is undoubtedly of a specific nature : we have, moreover, shown

that in rheumatic pericarditis there occur during life appreciable circumstances which distinguish it from common pericarditis. To make our statement perfectly accordant with the course of rheumatism, we must add, that the affection of an individual part does not always attain a degree which can be properly qualified as inflammation, since it sometimes subsides within forty-eight hours from its accession, terminating in what pathologists have named *delitescence*.

We have now to notice more particularly the effects of acute rheumatism on the internal surface of the heart. The primitive alterations consists in effusion, from the surface of the valvular apparatus, of lymph, which subsequently becomes organized. On the broad surface of the valves this lymph often assumes the form of false membrane; but on the chordæ tendinæ and the edges of the valves, it is disposed in the form of grains, which vary in size from a pin's head to a millet seed.

These granulations are sometimes confluent; at others, discrete or isolated; and often stud, like a string of beads, the parts we have mentioned. It has been correctly remarked by Dr. Watson, that on the aortic valves they often form a double festoon, following a natural line of division in the structure of those valves. The consistence of these morbid productions varies with their date: at first their substance is soft and friable, and of grayish colour, adhering very slightly to the lining membrane: as organization proceeds they become more solid, of a nearly white colour, and adhere so intimately to the subjacent membrane as to make one body with it; the grains now resemble, very exactly, syphilitic vegetations, and ultimately acquire cartilaginous hardness. The valves themselves are thickened and opaque, have lost their natural pliancy, and are sometimes puckered. In some cases lymph accumulates about the base of the valves in considerable masses, which occupy a large space in the cavity of the heart. This creates immediate and great impediment to the circulation, and dilatation and hypertrophy follow often with great rapidity.

All these alterations affect, especially, the valvular apparatus of the left side of the heart; and the mitral and aortic valves seem to be, in an equal degree, subject to them: the valves of the right side of the heart are much less so, and in a large proportion of cases of acute rheumatism are not at all affected; when they do suffer, the alterations are exactly of the same nature as those of the left cavities, and represent them in miniature.

This comparative exemption of the valvular apparatus of the right side of the heart is owing to its less tendinous structure; and, for the same reason, the pulmonary is less subject than the tricuspid valve to these alterations. Sometimes the affection extends to that part of the lining membrane which covers the muscular fibres; the appearances it produces are opacity and thickening of this membrane, and, but more rarely, the same kind of granulations as are found on the valves.

We have little to add to the remarks already made on the pathology of the joints. It is necessary, however, to state, that though the attacks of acute rheumatism be ever so frequent, concretions of lithate of soda are never formed, even in the small joints, and there is no fact to show that this salt is ever deposited in the course of rheumatism. We agree with M. Chomel, that the cases which have been cited by authors, as rheumatism terminating in suppuration in numerous joints, are cases, not of rheumatism, but phlebitis.

In those cases of rheumatism which terminate fatally, with symptoms of arachnitis, the appearances after death are by no means decisive. In no case on record were there found either false membranes or purulent effusion: in some, there were no morbid appearances; and in the rest, these were simply a turgid state of the vessels, and a small quantity of transparent or opaline serum beneath the arachnoid. As in all these cases there was also rheumatic inflammation of the heart, many pathologists have considered that the symptoms

observed were connected with that affection, and not with an independent morbid condition of the membranes of the brain. Their reasoning is open to many, and, we think, insuperable objections, though it may be said that this question is yet quite undecided.

Causes. Remarkable individual examples occur, which leave no doubt that the tendency to acute rheumatism is, in some measure, hereditary, but in what proportion has not been ascertained, and this interesting question is still open. The circumstance of an individual having already suffered an attack of acute rheumatism, constitutes one of the most efficient predisposing causes known.

Of forty-five examples of acute rheumatism, taken indiscriminately, seventeen occurred in persons who had suffered from it at least once before. Now the proportion of seventeen to forty-five is very much larger than that of persons who have had acute rheumatism to those who have not, in any given population, within the ages subject to the disease.

Men are more subject than women to this disease. Of the forty-five examples just mentioned fourteen only, or rather less than one-third, were women ; and these examples were collected in an hospital in which the admissions to the female medical wards were, for the time being, more numerous than those to the male wards. The greater liability of men is, perhaps, owing to their being more exposed to the exciting causes of rheumatism.

The great majority of cases of acute rheumatism occur in persons between fifteen and thirty years of age : we have never seen an example of it in a person beyond sixty or below eight ; nevertheless, children not more than four years old have been affected with it. Persons between forty and sixty are, however, more liable to it than those below fifteen. Bichat ascribed the immunity of young children to the soft condition of the fibrous tissue which, not having acquired its ultimate mode of vitality, was, he thought, unapt to develope those maladies of which it is the peculiar seat.

Thus far there is some analogy between rheumatism and gout, as regards predisposing causes ; but here that analogy ceases ; free living does not dispose to rheumatism, nor does temperance preserve from it. Husbandmen, and the poor generally, suffer from it at least as much as the rich, and probably more ; in fact, this disease is incident to persons of the most various constitutions and habits of life.

It has been erroneously maintained that a high state of nutrition predisposes to acute rheumatism. In eight of the forty-five cases, more than once quoted, the patients were weakened by previous indisposition when rheumatism came on. This is a proportion of nearly one in five and a half; now it appears from the tables of the friendly societies in England, that one in thirty-six only is constantly on the sick list. These tables are calculated for all ages above twenty, and for persons in nearly the same class of life as the inmates of hospitals. From this comparison it seems probable that debility predisposes to acute rheumatism : that it increases susceptibility of cold, is admitted on all hands.

The only known exciting cause of acute rheumatism is cold. This operates with more effect when it suddenly follows an opposite condition of the air, or when it acts on a person in a heated or perspiring state. This cause is recognised by the patient in the majority of cases, and there is no doubt of its reality.

Its effect is, in general, felt immediately, or, at furthest, at the end of a few hours. The cases are not rare, however (probably one-third), in which acute rheumatism comes on without any appreciable influence of these circumstances ; and in many, indeed, it is impossible, in our present state of knowledge, to assign any probable cause for the attack.

It is to be lamented, that the influence of seasons and climate has not been studied sufficiently to bear decisive evidence on this question. Acute rheu-

matism is much more frequent in the east than in the west of England.   We doubt whether this can be wholly accounted for by the known difference of climate ; but this is still an interesting field of inquiry.

Treatment.   No single remedy is yet known, nor any plan of treatment, which has the power of cutting short the course of acute rheumatism.

The objects to be kept in view are,—1, to limit as much as possible the dissemination of the local affection, and thereby, to diminish the chances of rheumatic inflammation of the heart ; 2, to moderate that inflammation in those cases in which it may occur, with a view to prevent or diminish the amount of morbid productions, as well as avert immediate danger ; 3, to diminish the severity of the affection of the joints, and to prevent it from continuing in a chronic form ; 4, to procure sleep.

We have shown that rheumatic inflammation of the heart is most common in severe cases, especially when there is much fever, and the parts affected are numerous.   It is our opinion, that it is the fever chiefly which tends to extend the rheumatic inflammation over a great number of parts, and thereby increases the liability of the heart, in common with other parts, to become affected with rheumatic inflammation.[*]

Our principal and leading indication is, therefore, quite clear : we must endeavour to moderate fever by appropriate means.   None are so well qualified to effect this as general bleeding, which has the additional advantage of mitigating the severity of the local affection in those parts which already suffer.   The measure of this remedy must be regulated by the degree of fever present, and by consideration of the resources of the patient.   In well-nourished men it may be had recourse to twice in the early stage of the malady with signal advantage ; but it should always be borne in mind, that there may be occasion for its repetition in a more advanced stage, on account of inflammation of the fibro-serous textures of the heart.   This consideration should warn us from being prodigal of the patient's resources in the early stage, though it should not be allowed to produce over-timidity in the first use of the lancet.   Much prejudice against bleeding has been kept up by the erroneous doctrine, that rheumatism of the heart is the effect of metastasis from the joints, which bleeding is supposed to favour.   As this objection to bloodletting is speculative only, and necessarily falls with the error in which it originated, it needs no direct refutation.   We may add, that in the forty-two cases already alluded to, in one-half of which rheumatism of the heart came on, bloodletting was not practised until the accession of the cardiac affection.

Purgatives may be associated with bloodletting, but some evils attend their use ; namely, the necessity of frequent movements, and some degree of exposure to cold : these evils may, however, be rendered very slight by good nursing, and then the moderate use of saline purgatives is attended with good effects. A dose of calomel, followed by a draught of senna and salts, may be given to begin with ; after that the use of active purgatives should be restricted to the occasional exhibition of the same draught when the bowels are confined, which, if opiates are given, will generally be the case.   In the intervals the patient may take about ℨvj of citrate, and ℨss of nitrate of potash, in divided portions, daily, in the form of common effervescing draughts ; or, in the same view (that is, of allaying fever), the eighth of a grain of tartarized antimony, and five grains of nitrate of potash, every four or six hours.

Much comfort is derived from opiates at night, and for this purpose the solution of muriate of morphia, or Battley's liquor opii sedativus, are to be preferred. A full dose of one of these should be given in pure water ; the exact quantity of the drug will, of course, vary with the age of the patient, the severity of the pain, and many other circumstances.   Opiates do not, according to our expe-

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[*] M. Louis has shown that, in pneumonia, typhoid fever, and many other acute diseases, the extent and number of secondary lesions bear exact proportion to the degree of febrile movement, and there is reason to believe this to be a general law.

rience, produce bad effects, and the comfort they afford to the patient is so great that he is always most desirous of continuing their use. Such is the general treatment to be adopted in acute rheumatism. The great number of parts which suffer precludes the possibility of local treatment for all, and it must therefore be reserved for those in which the affection may be very severe, or of unusual tenacity. In general, it is most required for the hands and feet, the joints of which are more apt than any others to become the seat of permanent effusions and rheumatism in its chronic form. Our practice must, however, be guided by the circumstances mentioned. Leeches, varying in number from six to twelve according to circumstances, should be applied on or near the affected part; when the hands or feet are the subject of treatment the leeches should be applied on the wrists or insteps, and the bleeding promoted in the usual way. In cases in which there is much pain in particular parts, and local bleeding is, for some reason, deemed unadvisable or unnecessary, much relief may sometimes be afforded by lukewarm poultices, and their effect may be improved by impregnating them with laudanum or decoction of poppy.

If, in spite of these means, the affection of particular joints continues after fever has subsided, nothing gives such signal relief as blisters. These should not be kept open, but repeated at short intervals as the case may require. It is when effusions into the joints give indications of becoming permanent, that the beneficial effects of blisters are most conspicuous. The diet is easily regulated. In the early stage of the disorder fever and loss of appetite interdict all solid or stimulating food; diluent and cooling drinks must be the sole support of the patient, and these may be varied to his taste; gruel, whey, weak broth, beef tea, and the like, are the first articles of nourishment to be allowed. In short, the diet must be the same as in all acute diseases of an inflammatory type; the only deviation from it, which it is proper to make, is an earlier return to substantial food; especially in simple cases, for it will be found that when the strength of the patient is restored early, he will be less susceptible of the impression of cold in convalescence than he otherwise would have been.

Such is an outline of the treatment to be followed in those cases in which rheumatism is confined to external parts. When it attacks the heart also, the vital importance of that organ calls for more energetic measures. Bloodletting, either general or local, or both, according to the strength of the patient, must be had recourse to, and indeed must be the basis of the treatment. The practitioner should not, however, be led on to repeated and unmeasured abstraction of blood by undue fear of immediate danger, an error into which those not acquainted with the usual course of these affections are very liable to fall. If the symptoms continue urgent after the first bloodletting, the further abstraction of blood should be made, in general, by leeches or cupping; the practice must, however, be regulated by the urgency of the symptoms and the powers of the patient. When the patient is already weak, the blood which it is deemed proper to take should be drawn in the first instance by leeches or cupping, rather than by venesection; in fact, local bleeding should seldom be dispensed with. But the point of greatest importance is, that these means should be applied early, and, especially so, when the internal membrane of the heart is affected, because our object is to prevent the formation of morbid productions in the cavities of the heart, in which organ a mechanical obstacle becomes a source of irreparable and fatal mischief. This rule of practice cannot be too earnestly enforced. The practitioner should not be induced by the trivial aspect of the symptoms in endocarditis, to let pass the only moment at which he can hope to act with material advantage; for, however the means employed in a future stage may alleviate present symptoms, they will almost certainly fail to remove those alterations which we have seen to be the usual product of this affection. By a timely adoption of these means great and immediate relief is always afforded, and in most cases this relief is permanent; there can be little doubt, therefore, that if

by this practice morbid alterations cannot be altogether prevented, their amount may be greatly diminished.

Bloodletting is alike efficacious in pericarditis and endocarditis, and in our general recommendation of it we have therefore made no distinction between these affections. Pericarditis is attended with more immediate danger, and, on that account, it is sometimes necessary to carry bloodletting further than in endocarditis. The advantages of local bleeding, as also of blisters, are more immediate in the former than in the latter affection: blisters should not be applied until bloodletting has been carried as far as expedient, and until the heat of the surface has fallen to its natural standard; when applied to the præ-cordia under these conditions, they often seem to produce much relief. The blistered surface should be allowed to heal immediately. In the slight returns of pain and palpitation which occasionally occur in the convalescence, blisters always afford prompt relief.

The internal treatment already recommended need not be deviated from. In our opinion, experience has not proved the efficacy of mercury in these cases. We have seen the common practice of giving calomel and opium very exten-sively tried, and have never observed any marked improvement take place even in pericarditis, on the appearance of the constitutional effects of mercury, whereas these effects are invariably attended with marked improvement of symptoms in all diseases over which mercury exercises curative influence. In the numerous cases that have fallen under our notice, in which rheumatism of the heart came on while the system was already under the influence of mer-cury, the course of that affection did not seem to be more favourable in conse-quence. We can also affirm from experience, that cases treated without mer-cury turn out equally well. We are aware that, in making these statements, we are much at variance with a large body of the profession in this country, and that, in raising a doubt, even, as to the efficacy of mercury in these affec-tions, we render ourselves liable to be assailed from many quarters; but it appears to us that the use of this medicine in this and many other affections has been suggested, at first by imperfect analogy, and afterwards persisted in with-out further inquiry as to its effects. Such analogy, however perfect it may seem, must be considered merely as a motive for the trial of a medicine, but never as evidence of its efficacy, which experience alone can determine.

We have now to examine the merits of various remedies and plans of treat-ment for acute rheumatism, which have at different times been much praised, and which have more or less engaged the favour of the medical public. Col-chicum has long held, and continues to hold, an ill-deserved reputation as a remedy for acute rheumatism. Having in eleven cases taken careful note of its effects, we did not remark in any one a favourable influence on the course of the disease; in six of the eleven the constitutional effects of the drug were produced in a very marked degree. From observation of numerous other cases we have been convinced of its entire inefficacy, and this conviction is also held by many physicians of great experience. It is easy to account for the main-tenance of its reputation: acute gout, when much disseminated, is often mis-taken for rheumatism; and the remarkable success of colchicum in these cases confirms medical men in their erroneous estimate of its virtues. Hence, also, the assertion that the efficacy of colchicum is more marked in the synovial than in the fibrous form of rheumatism, for, in gout, effusions are, generally speak-ing, more conspicuous than in rheumatism.

We have already spoken of calomel in combination with opium in the treat-ment of rheumatism of the heart. The dangerous nature of that affection may sanction, and, according to some, peremptorily calls for the employment of this remedy; but it is also much used in the treatment of acute rheumatism in the first instance, when the extension to the heart has not taken place. In our opinion, however, it is wholly without virtue; and when its use has not been preceded by bloodletting it has the effect of increasing the fever. We have

kept accurate notes of eleven cases in which it was used, in eight of which the constitutional effects of mercury were well marked. In not one of these did any decided amendment occur when these effects appeared; in four, on the contrary, an unfavourable change took place at that time, and in three of these four, extension of rheumatism to the heart occurred while the mercurial symptoms were present. These four cases were very protracted.*

Sudorifics have been very popular in the treatment of acute rheumatism, and still enjoy a high reputation with some. They are much used in the Infirmary of Edinburgh, where it is taught that, strong sudorifics employed after bloodletting in the early stage of the malady, often shorten its course in a remarkable manner. We confess that our objections to sudorifics are speculative merely, and founded on the consideration that sweating is naturally very profuse in acute rheumatism, and that, far from relieving pain, is more profuse as the pain is more severe. The warmest advocates of sudorifics state, however, that their efficacy is much less marked, or even questionable, after the very early period of the malady.. Their use should always be guarded by previous bloodletting, and be promoted by warm diluents; for, otherwise they are apt to fail in their sudorific effects, and in that case they invariably increase the fever. There is another objection to their use; the relaxation of the skin, which they produce, renders the patient remarkably susceptible of cold in convalescence, and thereby predisposes to relapses.

The employment of Peruvian bark was first suggested by the remittent character of acute rheumatism, and, like all other reputed remedies, it soon enlisted warm partisans. Dr. Haygarth, especially, was unqualified in his praises, but experience has shown that they were not deserved. Peruvian bark is now justly abandoned as a remedy for acute rheumatism, and its use, or rather that of sulphate of quinine, is restricted to those cases in which some tonic is required in the course of convalescence. The inefficacy of tartarized antimony, in large doses, has been well shown by M. Dance, in a memoir on the subject. We have ourselves made extensive trial of this plan of treatment, and our experience accords entirely with his. Before we conclude we must warn our readers against the danger of the repeated and unmeasured abstraction of blood, lately recommended by M. Bouillaud. The alleged efficacy of this treatment is entirely without proof, for the statements he gives in support of it are wholly inconclusive. On the other hand, he says nothing of the serious evils which must follow this sudden and excessive loss of blood, which, in females especially, must frequently occasion, for many years, total subversion of health, and if not entire ruin of the constitution, a most deplorable train of nervous symptoms, and permanent languor of all the functions.

2. *Chronic rheumatism.* Chronic is often the sequel of acute rheumatism, but also comes on in some cases quite independently of any previous acute attack. In either case the affection is of much the same character as acute rheumatism, the chief difference being less activity, with indefinite duration of all the symptoms. Fever and sweating are seldom present, and occur only when the local affection partakes of an acute character; in severe cases (the active chronic rheumatism of authors) these circumstances may continue with few intermissions, for many months, and the circumstances are then extremely harassing. In active chronic rheumatism the effects on joints are much the same as in the acute form; effusions take place into all the varieties of synovial capsules, and ligaments become permanently thickened by the long continuance of the affection. Thus the form of joints is much altered, their motions painful and impeded; and, when the disease does not yield to the remedial means employed, their structure becomes ultimately so materially injured as to cause premature and lasting decrepitude, while the continuance of harassing pain and fever waste the body

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* This furnishes us with an analogy which may be applied to estimate the probable effects of mercury on rheumatism of the heart with much greater strictness than any analogy drawn from the effects of this medicine in other diseases.

and destroy the health.   One remarkable feature of the disease is, that similar parts become affected so exactly alike, that the distortion of one joint is usually a perfect model of that of its fellow ; and the same is true even of bursæ and tendons.   As happens in acute rheumatism the pain is more severe at night than by day ; it is relieved or aggravated by warmth, according to the greater or less activity of the disease, and perspiration generally affords temporary relief.   The patient is very sensible to the state of the weather, and usually worse in a moist and cold, and better in a warm and dry air : hence recovery commonly takes place on the approach of summer ; it is seldom, however, complete, for the joints do not regain their natural state, and the invalid is much disposed to relapses on the return of the cold season.

In its less active form chronic rheumatism is distinguished by pain of the joints, which is increased by their movements, but is unattended with swelling or local heat ; the patient often complaining of an unpleasant feeling of coldness in the part affected.   This form is much less serious than that just described : it seldom disables the patient ; does not impair the general health ; does not become disseminated ; nor does it effect appreciable changes of structure.   Cold is its immediate cause, and the part which suffers is that which has been most directly exposed to it.   There is one remarkable point of difference between acute and chronic rheumatism ; in primitively chronic rheumatism the heart never becomes affected.   Many diseases, of which the exact nature is not known, but which seems to have some affinity with chronic rheumatism, have been included under that term, to the great confusion of the subject.   One of the most remarkable of these is spoken of by Sir B. Brodie, in his chapter on Inflammation of the Synovial Membranes of Joints, in the following terms : " There is a remarkable yet not uncommon form of the disease, which may be considered as bearing a relation to both gout and rheumatism, yet differing from them both in some essential circumstances.   The synovial membrane becomes thickened so as to occasion considerable enlargement of the joints, and stiffness, there being at the same time but little disposition to the effusion of fluid.   In the first instance the disease is often confined to the fingers ; afterwards it extends to the knees and wrists ; perhaps to nearly all the joints of the body.   Throughout its whole course the patient complains of but little pain, but he suffers, nevertheless, great inconvenience, in consequence of the gradually increasing rigidity of the joints, and at the number which are affected in succession.   The progress of the disease is usually very slow, and many years may elapse before it reaches what may be regarded as its most advanced stage. Sometimes, after having reached a certain point, it remains stationary, or even some degree of amendment may take place ; I do not, however, remember any case in which it could be said that an actual cure had been effected.   The individuals, who suffer in the way which has been described, are, for the most part, those belonging to the higher classes of society, taking but little exercise, and leading luxurious lives ; but there are exceptions to this rule, and the disease occasionally occurs in hospital practice, in men and even females of active and temperate habits."   We have seen one example of this affection, in which the disposition to effusions was very remarkable, and especially the rapidity with which considerable effusions into the knees from time to time took place, and were again absorbed.   We believe that this affection is essentially different both from gout and rheumatism ; the most remarkable point of difference being the signal freedom from pain enjoyed throughout its course.   It is probable that synovial membrane, and not fibrous tissue, is the primitive seat of the affection.

Treatment of chronic rheumatism.   This disease often baffles the seemingly best directed treatment, and has become a reproach to the medical art.   When, however, the structure of joints is not permanently altered, we may hope to procure much benefit, especially by local treatment.   This must vary according to the activity of the local affection : when there are indications of an active inflammatory process, local bleeding must be first had recourse to.   When the

affection is of a less inflammatory character, or has been moderated by local bleeding, our chief reliance must be placed on a succession of blisters, applied upon, or in the immediate neighbourhood of, the parts affected. When there is much pain great relief will be obtained by dressing the blistered surface at night with one-fourth or one-third of a grain of muriate of morphia, which will also procure sleep as effectually as if given by the mouth. But it often unfortunately happens that local bleeding and blisters cannot be employed to a sufficient extent, in consequence of the multiplicity of local affections, or of constitutional debility; and, as there are no general remedies, at present known, which exercise a directly beneficial influence on these affections, the two circumstances mentioned deprive us of our best resources, and render the treatment in a great measure nugatory. The general remedies usually employed in these cases are diaphoretics: Dover's powder, guaiacum, and sarsaparilla, are those which enjoy the greatest reputation, but their effects are after all very uncertain, and in most cases questionable. When there is much fever their use is improper; while the feverish state lasts the internal treatment must consist in the use of mild purgatives and salines. The eighth of a grain of tartarized antimony and five grains of nitre, given three times a day as recommended in acute rheumatism, will be found a very cooling medicine: we disapprove of general bleeding, because the good obtained from it is not sufficient to counterbalance the debility it produces. Warm baths judiciously employed are often of great benefit, and salt baths are to be preferred. There is a medicine which, from its great success as a remedy in affections of the periosteum, has lately come much into fashion in all forms of chronic rheumatism: we allude to the hydriodate of potash. Our own experience does not bear out the high encomiums which many have bestowed upon its efficacy in this disease; in many cases it has seemed to produce marked benefit, while in others it has totally failed. The results at present known certainly encourage further trial. The dose should not exceed five grains three times a day.

Diligent friction, especially when practised in the method called shampooing; warm affusion, conducted so as to impart a mechanical shock, and long perseverance in attempts to exercise the parts, often produce remarkable effects. In inveterate chronic rheumatism in our own country, all these means applied in the most judicious manner often fail to produce any permanent or solid advantage. We have yet to mention the most valuable resources known in the treatment of this disease; namely, a warm climate, and the internal and external use of thermal mineral waters. A long residence in a warm climate has often effected remarkable cures: Rome and Nice are the most eligible situations in Europe, but the climate of the West Indies seems to exercise a still more beneficial influence over this disease.

The beneficial effects of thermal mineral waters are now well established, and examples are not wanting of persons who have visited them quite in a crippled state, and have returned with their limbs restored to pliancy and use. The waters most celebrated in France are those of Neris, Mont-Dore, and Vichy; Aix-la-Chapelle in Savoy is much resorted to; and in Germany, Karlsbad and Wiesbaden. When the circumstances of the patient allow it, the beneficial effects of these waters might be confirmed by a winter's residence at Rome. It is almost superfluous to add, that in all cases patients should be carefully protected from the influence of changes of weather; a complete dress of flannel next the skin is of great importance; the diet should be mild and simple, not too low, but regulated with the view to promote the general health.

Muscular rheumatism. We have already stated, in the description of acute rheumatism, that the muscles, or rather their fibrous coverings, become affected along with the joints: the muscular affection of which we now treat is quite independent of rheumatism of the joints, although it often occurs in persons subject to acute articular rheumatism. It is more common in muscles of the trunk than in those of the limbs, and, usually, not more than one muscle is affected at a time. Its essential character is pain of the muscle affected, the

pain being very much aggravated by any attempt to use the muscle. The pain is not attended with swelling, local redness, or heat; and the patient commonly has a sense of coldness in the affected part. Febrile excitement is very rare, even in the severest forms of this affection. Cold is almost its only exciting cause, and the influence of this agent is generally so obvious as to attract the attention of the patient. It very commonly happens that the muscle which suffers is that one which has been most directly exposed. The most important varieties of this affection are lumbago and pleurodynia, and to these we shall specially direct our attention. In the detail of their symptoms we shall have little to add to what has been already said of the affection generally.

Lumbago. The pain of lumbago occupies the fleshy mass of the loins on one or both sides, and is very much increased by every movement of the back. When the affection is severe the patient is not only confined to bed, but quite incapable of moving his body without the help of others; and every change of posture causes excruciating pain. In milder cases the invalid can still walk, but with his body quite upright and stiff: he also chooses the most even ground, is unable to stoop, and when he turns, it is by a movement of the entire body.

Lumbago cannot well be confounded with those lumbar pains which are often the preliminary of febrile diseases, for these pains are scarcely or not at all aggravated by motion, and are attended by other symptoms which point out their character; nor with affections of the kidney or uterus, for these may be readily detected by their peculiar symptoms. It has been said, that caries of the spine, and some affections of the spinal cord, present greater difficulties; but in the former, the pain is not aggravated by motion in the very remarkable way in which it is in lumbago; and when motion is attended with much pain in caries of the spine, other and characteristic symptoms are usually present. The lesion of sensibility and motility in the lower extremities, in all affections of the cord itself, is sufficient to distinguish them from lumbago. Lumbago sometimes proves of long duration, and does not readily give way to treatment; it is also very apt to return.

Lying on the grass in summer is one of its most common causes, and it is sometimes brought on by a sudden and violent effort of the lumbar muscles.

Pleurodynia. Pleurodynia is characterized by an acute pain, which has usually the seat and character of the pain of pleurisy, and by the absence of the physical signs and general symptoms of the latter affection. The pain is generally felt a little below the breast, and is increased by pressure, by movement of the body, and still more by the act of breathing, and by cough, if present. One effect of this painful state of the intercostal muscles, is, that the inspiration on the affected side is less ample than on the other, and, consequently, the respiratory murmur is not quite so loud, nor the sound of percussion so clear, as on the healthy side; this is, however, very different from the dulness on percussion, and the altered character of respiratory murmur in pleurisy. In pleurodynia there is seldom fever; in pleurisy fever is rarely absent: as a general rule, the pain is more acute and more diffused in the former than in the latter affection. When the general symptoms and the physical signs are carefully inquired into, there can be seldom any difficulty in the diagnosis.

Pleurodynia is occasionally brought on by exposure to cold, at other times by cough or sneezing: in some cases its cause escapes observation.

It remains for us to speak of a slight but painful affection popularly designated *crick of the neck*. It consists in a very painful condition of the muscles of one side of the neck, which causes an inclination of the head to the side affected. Any deviation from that posture is attended with such severe pain that the patient cautiously avoids all independent movements of the neck, keeping the head in a fixed and characteristic attitude. In the state of rest the sensation in the part is more that of numbness than of pain. It is sufficient to know, that inflamed glands or a phlegmon may produce similar appearances, to prevent our being misled by them.

This painful malady is generally of short duration. It is often brought on by exposure of the neck to a draught of cold air ; sometimes by a sudden and abrupt turn of the head.

Rheumatism of the muscles of the limbs is not so severe and acute an affection as those varieties just described : it is also more wandering ; and it is in rheumatism of these muscles that the sense of coldness in the affected part is most frequently complained of. The muscles nearest the trunk are the most subject to it, those of the arm and thigh being much oftener affected than those of the fore arm and leg ; a circumstance first noticed, we believe, by M. Chomel. Rheumatism of these muscles does not disturb the general health, but often proves very tedious. It may be confounded with syphilitic pains by an inattentive observer. Syphilis is to be distinguished by the previous history of the patient, by the altered form of the bones, and by other characteristic symptoms.

M. Chomel has described rheumatism of the abdominal muscles, but the case which he gives as a type of that affection, at page 73, of his *Leçons Cliniques sur le Rheumatisme et la Goutte*, seems to us to be a case, not of rheumatism, but of neglected constipation. We have never seen these muscles affected with rheumatism.

This naturally leads us to remark, that pains sympathetic of visceral derangement are very apt to be confounded with rheumatism of the muscles. An affection simulating rheumatic lumbago or pleurodynia, is a very common effect of accumulations or obstruction in the large intestine ; a fact which should always be borne in mind by the practitioner. Pain in the limbs, also, is often merely indicative of derangement of the abdominal viscera. The chief distinctive character between these pains and those of rheumatism is, that the former are scarcely aggravated by motion, whereas the latter are so to a great degree.

The *treatment* of muscular rheumatism must vary with the seat and degree of the affection. In severe lumbago, abstraction of blood from the loins by cupping is the most certain remedy, and often effects an immediate and perfect cure ; it may be repeated with advantage if the symptoms are not completely relieved by its first employment. Narcotic liniments should also be freely used ; the patient should be kept in bed, be moderately purged, and live low. If the affection continues after a fair trial of these means, blisters must be applied to the loins, and the blistered surface may be dressed with muriate of morphia in the way described in the treatment of chronic rheumatism. Turpentine and balsam of copaiba have been extolled as remedies for lumbago ; in our experience, the latter has in some cases seemed to succeed after the means described above had been tried without material benefit. It should be given in doses varying from twenty minims to ₃ss three times a day. In all cases of lumbago, one of the most important points of treatment is to confine the patient to bed.

Pleurodynia is less obstinate. We have often known it completely removed by a mustard poultice applied over the seat of the pain. Opiate liniments are also frequently successful ; but if the affection be unusually severe, blood should be taken by leeches or cupping ; it seldom fails of being relieved by this measure. A blister and the local application of muriate of morphia will complete the cure.

In crick of the neck the local treatment may generally be limited to diligent friction with laudanum, warm fomentations with poppy-head decoction, and warm clothing of the part. More powerful measures are seldom needed : leeches afford immediate relief ; but in females, especially of the better classes, they are inadmissible, on account of the permanent marks they leave ; blisters are open to an objection of the same kind. Warm baths to the chin are often serviceable.

Rheumatism of the muscles of the limbs must be more generally treated by stimulating and opiate liniments ; local bleeding is not advisable ; but if the affection is obstinate blisters may be had recourse to with great advantage.

It is well remarked in the text, that the most important practical point connected with the study of acute rheumatism is the connexion of inflammation of the heart with the rheumatic fever. There is no doubt whatever that the British physicians were the first to point out the connexion; and it was also well known in this country, but in a loose indefinite way, so that the exact nature and extent of this relation certainly was not known until the researches of Dr. Bouillaud; and although his claim to priority is unfounded in many respects, yet he was the first to establish the true rules which govern the developement of heart disease during the course of rheumatism, and to show that it arose directly during the inflammatory period, and rarely from metastasis. These researches could not have been made without the assistance of auscultation, because the cardiac disease is either quite latent in the majority of cases, or so nearly so that the patient complains only of a dull feeling of uneasiness, which he soon forgets·

Rheumatism attacks the heart in the acute disease in three different ways : the inflammation of the internal membrane is the most frequent, and if severe, is attended with the most distressing symptoms, which depend chiefly upon the thickening of the valves. As to the description both of endocarditis and pericarditis we have little to add to the text. The latter is known by the signs indicative of effusion into the pericardium, and by the creaking in cases where the quantity of liquid is extremely small. The endocarditis is at first recognised almost exclusively by the bellows or rasping sound which occurs during the systole of the heart, and the gradual diminution of the second sound as the inflammation and the congestion of the heart advances. When the blood remains comparatively stagnant a coagulum forms in the heart, and the second sound is gradually lost, while the augmented size of the organ renders the percussion dull. The signs of some of these lesions often remain for a long time after the active period of the inflammation is passed.

There is a second modification of the action of the heart which is not positively connected with inflammation of its membranes. It occurs chiefly during the active period of the inflammation, but it also follows the rheumatism, or several successive attacks of it; or it occurs after simple muscular rheumatism, when the patient has not kept his bed at any period of the disease, and is then slowly developed. It is in fact a mere muscular disease of the heart, and, in the acute form, produces a disturbance in the functions of the organ, which resemble in some respects the membranous inflammation; and in chronic varieties terminates generally in hypertrophy. The latter lesion arises perhaps more frequently from the muscular disease than from inflammation, and is a more common result of chronic than of acute rheumatism. The muscular disease differs from ordinary inflammation, or at least it is modified by the peculiarities of the structure affected, and has very nearly the same relation to the membranous inflammation that muscular bears to articular rheumatism. In the acute form the first sound of the heart is slightly modified, and its action becomes quick and spasmodic; this modification does not generally amount to a bellows sound, although it sometimes does : in the chronic form the muscular rheumatism is almost always connected with hypertrophy, and the signs of the two diseases are generally more or less confounded together. The disease is not always attended with pain; that is, the most essential element of ordinary rheumatism is not always present, and when this is the case the affection sometimes escapes notice; in other cases it is perfectly understood and readily recognised.

The third variety is that in which the inflammation of the joints diminishes when the cardiac irritation begins; that is, a real metastasis occurs. The disease of the heart is then generally inflammation of the pericardium or endocardium, although it is sometimes a pure rheumatism of the heart.

The *treatment* of acute rheumatism is still attended with difficulty; that is, the treatment which is strictly curative and will entirely arrest the disease. The remedies that relieve are very numerous, and some of these will so far moderate the symptoms that the cure will speedily follow; but none is actually certain in its action, and often all fail. The opinion of physicians is on the whole decidedly in favour of bloodletting in the more violent cases, but carried only to a moderate degree, and not, as advised by Dr. Bouillaud, in inordinate " doses." The utility of local depletion is equally incontestable, especially of cupping to the spine when the pain extends from the spine to the joints; we do not believe it equally beneficial when the spine is not directly affected, although Dr. Mitchell advises it even under such circumstances. Depletion to the joints themselves is less convenient.

The usual practice at Philadelphia is to resort to depleting measures at first in severe cases, and afterwards to prescribe an opiate, either alone or in combination with a nauseant diaphoretic : such as the Dover's powder and small doses of tartarized antimony. These may be given if the perspiration, which forms a necessary part of the disease when it passes through its regular stages, should be arrested. Sweating will not cure, if excessive, it may weaken the patient most injuriously, but to some extent it certainly forms a natural outlet in acute rheumatism, and cannot be suppressed without proportionate mischief. Opium alone, in large doses, given so as to produce a tranquillizing, and almost a narcotic effect, is recommended in New England as one of the most successful and least painful modes of treatment. This remedy is certainly almost indispensable ; but we cannot approve of the very large doses in which it has been given ; there is always danger in producing a near approach to narcotism, and the treatment will not in most cases arrest the disease.

Colchicum is a favourite remedy with many physicians, either in a simple form or combined in that of Scudamore's mixture. It is an excellent revulsive ; but is of course much too irritating whenever the digestive canal is at all disordered. Many other remedies of the acrid narcotic kind, and more or less similar to colchicum, such as veratrum album, &c., are used occasionally in the treatment of rheumatism, and produce more or less service as palliatives in nearly every case, but as irritants of much strength they are not free from inconvenience. Diaphoretic drinks, especially if they possess some other medicinal property than that of determining to the skin, are useful remedies ; with this view the decoction or tincture of cimicifuga is occasionally very useful : still its good effects are extremely uncertain, and we cannot rely upon it with sufficient certainty to induce us to depend upon it to the exclusion of other remedies.

Chronic rheumatism is one of the most difficult diseases to treat. Whether it succeeds to the acute variety, or is from the first chronic, matters but little : if once firmly settled in the system it resists most remedies. Those which promise the best success, are the alterative diaphoretics, local anodyne or stimulant applications when the temperature of the part is reduced, and general alteratives. The compound decoction of sarsaparilla is often of great benefit, or the powder of guaiacum combined with sulphur, or with camphor and Dover's powder, given in quantities not sufficient to derange the bowels, and combined with some aromatic. The decoction of cimicifuga, and various other remedies, which combine, with alterative properties, a slight narcotic effect, are sometimes of benefit. If the pain radiate from the spine, cups near the vertebræ sometimes quickly dissipate it. The benefit of cups or leeches to the affected parts is, however, quite problematical, unless there should be pain or swelling at the joints. A much better application consists of those remedies which keep up warmth in the part and excite the cutaneous perspiration, such as the oiled silk, thin sheets of caoutchouc when not too irritating, and soap plasters, or simple flannel bandages. Stimulants of a different kind, as the oil of cajeput and of turpentine, are occasionally used both internally and externally in chronic rheumatism, to excite the capillaries of the skin, and oftentimes relieve the pains in affected joints.

If the remedies recommended by authors fail, as is often the case, the different mineral waters which have acquired a celebrity in the treatment may be resorted to, as the Carlsbad and Bareges Springs recommended in the text, and the Hot Springs of Virginia. The latter are the only hot springs much resorted to in this country, those of Arkansas being comparatively little known, although of much higher temperature. The Bath County Springs of Virginia do not exceed 106 degrees, they are not drunk internally, but used exclusively for bathing, and in the form of spout-bath or douche. In many cases they succeed admirably well, but in others fail entirely, like all other remedies in this disease. A warm climate is the last and sometimes the most successful means of preventing a return of the disease, if not of curing it.

There is no disease which affords a larger field for empirics than chronic rheumatism. Their remedies almost always consist of different embrocations or liniments, of terebinthinate or other stimulating substances often combined with anodynes. They give relief for a time, but, in the majority of cases, the pain afterwards returns. Still we must not omit these external palliative means ; they often soothe the patient, and are so readily prepared by every practitioner that there can be no good reason for neglecting them.   G.

G O U T.

The term Gout, derived from the Latin word *gutta*, a drop, was first employed to designate the disease we treat of, by physicians of the old school of humoral pathology, and was adopted in accordance with their theory, that the local affection in gout is caused by the distillation, " drop by drop," of a peccant humour in the structure of the joints.   As this theory was very general, we accordingly find synonymes of the word *gout* in most European languages :— *Gicht* (Germ.), *goutte* (Fr.), *gotta* (Ital.), *gozza* (Span.)

Some modern physicians have endeavoured to substitute for this word the term *Arthritis*, intended to express a different theory of the disease ; but as this theory is at least as imperfect as the old one, the word *gout* should be retained, were it only on a title of priority.   Gout was well known to the Greek, Roman, and Arabian physicians.   The Greeks gave the local affection special names, derived from those of the parts which happened to be affected.   Gout of the foot was called ποδαγρα ; gout of the hand, χειραγρα ; and so on.   It appears from their writings that the ancients confounded gout with rheumatism, and considered them one disease ; although most moderns distinguish them in theory, yet the serious error of mistaking gout for rheumatism is often committed in practice.

Gout has in all times been observed to affect chiefly the rich and well-fed members of society ; and it may be gathered from the pleasantries of many Greek and Latin authors, that the victims of this disease were not favoured with a greater measure of sympathy in ancient times than they enjoy in our own. It very seldom comes on before the age of thirty or thirty-five, never before puberty, and it is very much rarer in women than in men. Spring and autumn are the most common seasons of its attack, but summer does not wholly preserve from it.

Symptoms.   The first fit of what may be termed *acute* gout, is sometimes preceded, for a few days, by slight derangements of health, but more frequently comes on suddenly, and often without obvious cause.   The suddenness of the attack, in some cases is very remarkable.   It is generally at night that the first symptoms are felt.   The patient is awakened soon after midnight by acute pain in the first joint of the great toe of one foot.   This pain is often preceded by, or attended with, slight rigour, which is soon followed by fever with great restlessness.   These symptoms continue ; and the next morning the affected part is of a bright red, much swelled, and exquisitely tender.   The joint is quite disabled, and the neighbouring veins are very turgid.   In slight cases the symptoms abate towards morning ; but, in severe ones, the pain continues to increase for about twenty-four hours from its first accession ; it then suddenly remits, and the affected part, when examined, is found to be more swelled than before, and also œdematous ; in some cases the skin of that part has a shining appearance, as if varnished.   At this crisis, gentle perspiration comes on ; and the patient, relieved from pain, falls asleep.   The relief from pain is often so sudden, that,

as Sydenham remarks, the patient is inclined to attribute it to the last position given to the gouty limb. As the pain abates, the fever subsides, and this improvement continues until the following evening. The symptoms then return, and the patient is harassed throughout the night with acute pain and fever; the next morning these abate as before. The disease continues to hold this course, but the symptoms gradually diminish in severity; and at the end of a period, varying from five to ten days, the patient is generally restored to his usual health. The œdema, which at the height of the paroxysm is very considerable, continues for a short time after the cessation of the other symptoms. In convalescence, the cuticle of the affected part peels off—a process usually attended with much itching. In the first fit of gout there is seldom more than one joint affected, and the attendant fever seems proportional to the severity of the local affection. There is much loss of appetite, and increase of thirst; the urine is scanty, and deposits, on cooling, an abundant brick-coloured sediment. The bowels are generally confined.

Such is the usual course of a first fit of gout; but it often happens that, before experiencing so well-marked an attack as that described, the patient has, at times, suffered some degree of lameness and soreness of one foot, of which the true cause was not suspected.

Some of the circumstances we have noticed, must now engage more particular attention. We have stated that, in most cases, the attack cannot be ascribed to any obvious cause; in some, however, it seems the effect of local injury, as a bruise or sprain; and when the gouty inflammation which follows is not attended with much constitutional disturbance, the error into which the patient has fallen, regarding the nature of his malady, remains uncorrected. We have known instances of first gout being mistaken for a sprain, both by the medical attendant and patient, and treated accordingly; but, in general, the sprain is a pretext adopted by the patient in order to escape the imputation of being gouty, to which most persons have a great aversion. Convivial excesses are sometimes the immediate cause of the paroxysm. The œdematous nature of the swelling in gout is of some value as regards diagnosis; it is not always present, but is seldom wanting when the affected part is not deep-seated; it is more frequent and more extensive, when it does occur, than in acute rheumatism. Desquamation of the cuticle is the sequel of erythema of the skin, which, like œdema is most common in gout of superficial parts. This erythema is sometimes wide-spreading, and in appearance much like erysipelas. After it has been some time present, its original bright red tint generally changes to some shade of purple. Œdema and desquamation are most common in gout of the hands and feet, and are therefore seldom wanting in the first fit. One of the most remarkable circumstances in the history of the first fit is the great proportion of cases in which the great toe is alone affected. Sir C. Scudamore found this the case in 130 of 193 instances; in other 10, the gout was limited to the two great toes, and in all, except 8, the joints affected were exclusively those of the foot and ankle of one or both legs.

In those rare cases in which many joints become affected in the first attack, its duration is prolonged, sometimes to a period of several months. After recovery, the functions of the joints which have suffered are not sensibly impaired.

When those causes which foster the gouty diathesis continue to operate, the attacks do not fail to return, their frequency depending, in great measure, on the degree of influence which these causes are allowed to exercise, and on the hereditary predisposition of the individual. In general, however, there is an interval of a year, at least, between the first three or four attacks, and we have even known a period of seventeen years elapse between the first and second. In these subsequent attacks, the local affection is limited to the part affected in the first gout, or to that part and the great toe of the other foot; seldom more than one or two joints are affected at once. It is worthy of remark, that fits of

gout often observe an exact periodicity in their return; occurring with great regularity in a given month for many successive years.

When the gouty diathesis is confirmed, the paroxysm is generally preceded, for a period which varies greatly in different cases, by transient gouty twinges in the part about to be affected, or by various derangements of important func-tions. These derangements, either on account of their peculiar character, or because they suddenly cease when gout is developed in the extremities, are fairly presumed to be essentially connected with, or rather part of, the disease; and it is, therefore, important to give an account of them in this place.

Indigestion, with unusual tendency to heartburn and sour eructations, so fre-quently precedes the gouty paroxysm, that theories of the intimate nature of gout have been founded on the consideration of this single circumstance. This form of indigestion may continue for months before gout appears in the extremities, and indeed gouty persons are at all times singularly liable to it. The secretion of urine is deranged not less frequently than digestion. In some cases the urine, for a few days immediately preceding the paroxysm, is scanty, high-coloured, and much charged with red deposit; in others, on the contrary, it is usually abundant, pale, and limpid—a condition observed, for the most part, in the urine of persons of nervous temperament or exhausted constitution.* Severe headaches, with disturbed sleep and great languor, are perhaps the next in order of frequency as precursory symptoms; and low spirits and despondency are very remarkable and very common indications of an impending paroxysm. Palpitation of the heart, recurring at uncertain intervals for many weeks, and in other cases attacks of difficult breathing resembling asthma, have been known to precede the gouty paroxysm, and to give way suddenly and permanently to developement of gout in the extremities. But when regular paroxysms of gout have already occurred, there are generally other and more characteristic symp-toms to announce their approach. Such are transient gouty twinges, as before stated; also soreness and stiffness of the feet, especially after exercise; sup-pression of their habitual perspiration, and, occasionally, cramps in the gouty limbs: these symptoms sometimes occur alone, but are more often associated with some of the functional derangements noticed above. It is important however to add, that even in cases of confirmed gouty diathesis, a severe paroxysm sometimes comes on without any precursory symptom, or at least, without any of sufficient moment to attract the attention of the patient.

In some persons, gout, however numerous its attacks, never affects any joints but those of the feet; in all, the feet and hands suffer more than other parts. In most cases, however, it becomes more disseminated; and when the diathesis is very confirmed, many external parts are affected in a single fit.

In a case of chronic gout, (the sequel of an acute attack), which lately fell under our observation, the left knee was much distended with fluid for nearly two months; there was also pain of the chest, with difficulty of breathing; and these symptoms were found to depend on gout of the sternum and cartilages of the ribs, marked by great local tenderness and considerable œdema. In severe attacks of acute gout, the insteps, ankles, knees, elbows, and wrists, may suffer in turn, or several of these parts may be affected at once. In addition to the appearances described as present in the first fit of gout, we now observe abun-dant effusions into capsules of joints, into bursæ and sheaths of tendons. We have seen the capsules of both knees, and the bursæ on the olecranon of each elbow, greatly distended with fluid, while there was also considerable effusion into the tendinous sheaths of the wrists and ankles.† In such cases the pain is excruciating, and is described by the patient in superlative terms. Thus it is

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* In appreciating the quality of urine, it is essential to ascertain the proportion of diluents used by the patient; and the morning urine is, for obvious reasons, to be selected for exami-nation.

† Cases of this description are often mistaken for acute rheumatism by inattentive practi-tioners.

hyperbolically compared to crushing the joint—to forcibly tearing it asunder—to pouring boiling lead on the part—to the gnawing of a dog; and the like. There is much throbbing in the affected parts, with a sense of great tightness and of cumbrous weight. As effusion proceeds, the acuteness of the pain diminishes, while the throbbing and sense of weight continues.* The sufferings are often aggravated by cramps; the weight of the bed-clothes is insupportable, and the tread of another person across the chamber is painfully felt by the patient. If the affected parts be enveloped in flannel, a copious exudation from their surface takes place, emitting a peculiar and characteristic odour, which often pervades the whole apartment.

While the joints are in the condition just described, there is also much fever. The face is deeply flushed; there is total loss of appetite; urgent thirst, with furred tongue and confined bowels. The urine is scanty; its specific gravity increased, and on cooling it deposits an abundant brick-coloured sediment, together with much mucus. When the urine is inordinately charged with this deposit, there is often pain in the bladder, and scalding in the urethra when the urine is voided. In a very severe fit of the gout, the pain and fever may continue without remission for the first three or four days. After this, the symptoms abate towards morning, to become worse again as night approaches. If no curative means be had recourse to, several weeks, or even months, may elapse before permanent convalescence is established; but during this period a transient respite from pain and fever, for a few days, may happen more than once. True convalescence is indicated by gradual diminution in the severity of the exacerbations; cessation of fever; restoration of the healthy characters of the excretions (especially of the urine); and return of appetite. At this period, the patient is thin and feeble; the gouty joints are weak, puffy, and œdematous, or their capsules still distended with fluid. The weakness of the gouty limb is, in some cases, very remarkable, almost amounting to paralysis. When, however, the structure of the joints has not been materially and permanently injured, nor the constitution broken down by a long series of attacks, recovery is pretty complete; the œdema about the gouty joints gradually subsides; effusions become absorbed; and, with returning strength, the patient regains a tolerably free use of his limbs. The ailments we have described as preceding the fit are for a time removed, and the general health thereby much improved.

Chronic Gout. When the favourable conditions just stated are reversed, it more commonly happens that the fever subsides, the local affection becomes less inflammatory in character, and gout continues in a *chronic* form. In this form the parts affected are either of natural colour, or much less red than in *acute* gout; the pain of the joints is less severe and more wandering, in many cases alternating with pain and cramp in the stomach; but copious effusions still take place into capsules of joints and into bursæ, and continue many months. In chronic as in acute gout the pain of the joints increases at nightfall, and is then generally attended with slight fever, rendering the patient watchful and restless. The limbs are disabled for exercise, and the patient always evinces much caution in changing their posture. The general health is much impaired, the complexion sallow, the countenance haggard; there is great languor, debility, and depression of spirits; appetite is uncertain, and digestion difficult, with much disposition to heartburn. We have here described the chronic gout as the sequel of acute attacks; but it may also be primitive, and follow the course described without having been preceded by acute gout. In inveterate chronic gout the patient has scarcely any respite, except during two or three of the summer months. It is in cases of this kind, chiefly, that concretions are observed, which, when of considerable size, or occupying cavities of joints or the texture of tendons, tend more than any other circumstance to render gout

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* This diminution of pain on the supervention of effusion is analogous to what occurs in pleurisy, pericarditis, and many inflammations that terminate in effusion.

permanent. These concretions, however, are formed much earlier in some
cases than in others. The matter of which they consist is at first semi-fluid
hydrated lithate of soda ; and (as we shall hereafter more particularly notice)
a layer of it, of the consistence of thin plaster, is often found coating that part
of the synovial membranes which covers the heads of bones. The more fluid
parts of this matter become gradually absorbed, leaving the salt alluded to in
the form of a solid friable concretion. Such concretions receive additions to
their substance not only from the effusions of successive paroxysms, but also, in
the intervals of these, from the gradual deposition of lithate of soda ; and in
this way they often attain a large size. They are most frequent, and larger
than elsewhere, in the joints of the hands and feet, which they distort into most
unsightly shapes ; but there are few parts subject to gouty inflammation alto-
gether exempt from such concretions. Their presence modifies a fit of gout
both with regard to its course and local appearances. Their condition in a
paroxysm is admirably described in the following passages, which we quote
from a paper by Mr. James Moore :—

" When a violent fit of the gout attacks a chalky tumour, the appearance
is frequently very alarming, the new paroxysm being accompanied with a
fresh serous and chalky effusion, which, added to the old deposit of chalk,
occasions a prodigious swelling ; the cutis, when distended to the utmost,
opens, yet sometimes the cuticle remains entire. The chalky or serous fluid
may then be seen through the semitransparent epidermis. The surrounding
integuments appear of a deep red or purple hue, threatening mortification,
while the pain is excruciating. At lengh the cuticle gives way, a discharge of
serum and chalk takes place, and a remission of all the symptoms usually
follows. During the whole of this alarming process, suppuration never oc-
curs ; but soon after the opening has taken place suppuration commences, and
chalk and pus are then discharged from the ulcer. When an opening is
formed, the whole of the chalk never escapes, and its complete evacuation is
usually a very tedious process. This is owing to its being diffused through
the cellular membrane, as in the cells of a sponge. One cell must sometimes
give way after another, and small portions of chalk are successively thrown
out ; so that months and even years pass away before the whole is discharged.
It also frequently happens that the orifice contracts and closes over, leaving
portions of chalk underneath. This kind of cicatrix sometimes stands its
ground, but more commonly breaks out again and again to discharge chalk.
Even openings into joints, which are so dangerous when occasioned by other
extraneous bodies, are often attended with no serious symptoms when the
joint is filled with chalk." (*Med. Chir. Trans.* vol. i.)

Mr. Moore remarks justly, that the suffering occasioned by these concre-
tions is not owing to any irritating quality they possess, but to the pressure
and distension occasioned by their bulk, and to the obstruction they offer to
the motion of tendons and joints.

It has been stated already, that during the paroxysm of gout the urine deposits
a copious brick-coloured sediment composed chiefly of lithates. Sir C. Scu-
damore has ascertained that, at the same time, the urine contains an excess
of urea, as indeed of all solid ingredients. Dr. Prout has made some inte-
resting observations on these points. Speaking of urinary deposits in febrile
diseases generally, he says, " The deeper the colour of the sediment, and the
more approaching to red, the more severe, in general, the symptoms ; and it
may be mentioned, that the most decided and most strongly marked specimens
of the kind which I have seen, have been deposited by the urine of gouty in-
dividuals, in which case, as before observed, the sediment consisted chiefly of
lithate of soda, and the tinging substance appeared from the tint to be the pur-
purate of soda." (*Treatise on the Diseases of the Urine*, p. 123, 2d ed.)

It is proper to add that the urine, however much charged with the material
of these deposits, is transparent when first voided, and that red deposits are

not uncommon in other febrile diseases ; in rheumatism especially they are very copious ; scarcely less so than in gout.*

But it is also common for gouty persons to pass an excess of lithates in their urine in the intervals of gouty paroxysms, and these persons are more liable than others to gravel and calculus of lithic acid origin. Dr. Prout says, " Besides these amorphous sediments, consisting chiefly of lithic acid, I have seen two or three instances in which large quantities of perfectly white lithate of soda were deposited from the urine. In one case, in particular, the quantity was immense, and voided, not only mixed with the urine, but in a state of consistency like mortar, especially during the night, so as to produce great difficulty in passing the urine. I suspected the existence of gouty irritation or abscess in the kidneys in these cases." (*Ibid.*, p. 127.)

The deposition of lithate of soda in joints and other parts affected with gout, proves that the formation of this salt is not a functional act of the kidneys, and the separation of it from the blood by tissues so remote from one another, and so various in structure, further proves that it exists already formed in that fluid.†

Hitherto we have described gout as affecting chiefly the structure of joints : they are indeed its most common seat : but many other parts, including some of the viscera, are subject to its morbid action. Of external parts, almost all that are composed of fibrous tissue are liable to gouty inflammation : we may particularize aponeurosis of muscles ; the sclerotica ; cartilages of the nose, eyelids, and ears ; ligaments, other than those of joints ; the periosteum, and probably the tunica albuginea of the testicle. Morgagni relates an instance of acute gouty ophthalmia in his own person, and we have seen a case of the same kind. In both the ophthalmia came on at the beginning of the attack, and its nature was inferred from its not running the usual course of common inflammation, and from its immediate subsidence on the developement of gout in the extremities. It has been remarked by a surgeon of eminence, that in persons afflicted with gout, operated on for cataract, gouty inflammation often attacks the eye and causes blindness, either by acute inflammation, with rapid effusion of lymph into the vitreous humour, or by the slower but equally destructive process of repeated inflammation of the sclerotica.‡ Gout affecting the whole surface of the forehead, temples, and eyelids, is not uncommon ; the aponeurosis of the abdominal muscles is also sometimes its seat ; and in some other cases the symptoms seem to refer to the tendinous centre of the diaphragm. But it is when gout attacks internal organs that it puts on a most alarming aspect, and becomes immediately dangerous to life. As in this case the gout of the extremities generally subsides rapidly when the internal affection begins, the term " retrocedent gout" has been adopted to express it. The stomach, or the stomach and intestines, are almost invariably the organs to which retrocession takes place : there are no well authenticated examples of transference of gout to the lungs ; and instances of gout affecting the heart are few, and not described well enough to be conclusive. The most marked case we are acquainted with of gout affecting the heart is described by Dr. Haygarth in the *Medical Transactions*, vol. iv.

Apoplexy, or other symptoms of cerebral congestion, sometimes come on when gout is repelled by cold applications. Such cases, are, however, rare ; and we shall confine our further remarks to gout of the stomach and bowels. It has been already stated that in chronic gout a painful affection of the stomach sometimes alternates with that of the extremities. This affection is

* Sir C. Scudamore has endeavoured to connect these deposits in gout with derangement of the liver : in acute rheumatism it seems impossible to do so without indulging in unwarrantable hypothesis.

† Since this salt is an ingredient of healthy urine, there can be no doubt, from the reasoning in the text, that it exists also in healthy blood.

‡ We are indebted for this valuable remark to our friend Mr. Barnes of Exeter.

not inflammatory in character, nor, generally, dangerous to life; the pain attending it is like cramp or gastrodynia, and is usually relieved by pressure; the heat of the surface is rather below than above the natural standard, and there is seldom vomiting. But when affection of the stomach succeeds to well-marked acute gout of the extremities, in the height of a febrile paroxysm, the symptoms are much more alarming, and often tend rapidly to a fatal issue.

In such cases the pain is very severe; is usually attended with incessant vomiting, or hiccough, and, when the bowels are affected, with profuse diarrhœa also. At first there is considerable fever; but if the symptoms are not relieved, collapse ensues early, and soon terminates in death. The early symptoms are therefore of an inflammatory kind, like those of the affection of which they have taken the place. It is of the highest importance to discriminate well between these two forms of gout in the stomach, because they require opposite plans of treatment. There can be no doubt that these internal affections are as specific in nature as the gout of external parts. We consider the following facts to be sufficient proofs of the truth of the proposition. The affections in question do not run the course of common inflammation, or of any other simple form of disease: they alternate in a complete and remarkably sudden manner with gout of the extremities, and if we can succeed in fixing the latter, the internal affection is at once and permanently relieved.

Diagnosis. Rheumatism is the only disease which can be readily confounded with gout. Identity in the seat of the local affection is not the only point in which they resemble, and it often requires patient inquiry into the history of the disease, and accurate scrutiny of present symptoms, to enable us to distinguish between them. For lack of these precautions, gout is often mistaken for rheumatism by men of large experience, and we believe that it is by mistakes of this kind that colchicum maintains its undeserved reputation as a remedy for rheumatism. In a first fit of gout, the seat, and limited nature of the local affection, the appearance of the part, and the other circumstances detailed in the description, are characteristics of sufficient peculiarity to preclude doubt about the nature of the malady: it is not here that the difficulty lies, but in more advanced cases, when numerous joints are simultaneously affected. In such cases the history of former attacks is of much assistance, as may be seen from the statement already quoted from Sir C. Scudamore, that in 190 of 198 cases gout was limited, in the first fit, to the joints of the feet and ankles: such a limitation never occurs in rheumatism. The age of the individual is a circumstance of less extensive bearing, for although gout never occurs in childhood, and rheumatism often does, yet, as we have elsewhere shown, adult and mature age are, much more than infancy, exposed to the latter disease. Much stress has been laid on the statement, that gout comes on without obvious cause, and that rheumatism may always be assigned to an evident one; namely, exposure to cold. But the paroxysm of gout may often be attributed to the same cause, while in many cases of acute rheumatism the operation of any obvious cause altogether escapes the notice of the patient.

But the symptoms of gout, narrowly observed, will be found to differ considerably from those of rheumatism. Œdema of the affected parts, and desquamation of the cuticle, we have already adverted to in the description of gout; they do not always exist, but, when both are present, they may almost be considered pathognomonic of gout. Sir C. Scudamore makes the following statement in regard to desquamation :—" In 98 cases in whom I have examined this point, I find that 25 have never experienced this symptom: not more than 6 of the 73 invariably, and many of them in some fits and not in others; and in no instance, I believe, except from the hands and feet."

Œdema is much more general, and is, we believe, present at some period in the course of every fit. In acute rheumatism, œdema is rare; and, when it does exist, is not nearly so marked as in gout. This is therefore a character of

considerable value. In gout the variation from day to day, in the degree of fever, is much greater than in acute rheumatism ; passing, in the course of a few hours, from the highest degree of febrile excitement to complete apyrexia, and this to be followed as suddenly by return of fever. We know of no other single circumstance which marks so well the distinction between these two diseases. In rheumatism, when pain is severe and fever considerable, there is always profuse sweating ; in gout, sweating is often absent, and when present, is very much less abundant than in rheumatism. Something also may be gathered from the nature of the pain, which is more agonizing and more deep-seated in gout. In cases of gout, where only one or two joints are affected at a time, this limitation of itself excludes difficulty. Chronic gout being generally a sequel of acute gout, and occurring when fits of the latter have been both frequent and protracted, the history of the disease elucidates its nature. Occasionally, however, and especially in persons of a weak constitution, and in women, chronic gout is primitive. A careful scrutiny of the history of the malady generally suffices to establish a diagnosis ; but local signs are not wanting. In chronic gout there is often not more than one joint affected, never many at a time ; and the affected parts generally exhibit œdema in a remarkable degree. The reverse of these circumstances are observed in rheumatism. The hands and feet are also more exclusively subject to chronic gout than to rheumatism : bursæ, synovial capsules, and sheaths of tendons, may be distended with fluid in either.

We have not referred to syphilitic affections of the bones : to confound these with gout can happen to those only whose ignorance is exceeded by their negligence.

Pathology. In the foregoing description we have made known various important lesions which affect ligamentous and tendinous structures and contiguous synovial capsules. We have seen that the principal morbid change appreciable in the living subject is effusion of fluid into these capsules, and into the cellular tissue adjacent to tendons and ligaments ; and that this effusion of fluid is generally attended with acute pain, swelling, local redness, and much febrile excitement ; circumstances which point out the inflammatory nature of the affection. On the other hand, the hereditary succession of gout, its spontaneous accession and repetition, prove it a constitutional disease ; while the course and products of the local inflammation further prove that inflammation to be specific in kind. The formation of gouty concretions has already been described at some length. On dissection they are found to occupy the cavities of joints and bursæ, the substance of tendons, and the cellular tissue adjacent to ligaments ; in the latter situation the lithate of soda is deposited in separate cells, and not in a cyst. The manner in which the concretions are, as it were, impacted in the tissue of tendons, suggested to Musgrave the expression,—" Tophi in tendinibus tanquam clavi trabibus impacti, non raro observantur." We have remarked that the material of these concretions is fluid when first effused, and that it becomes solid by absorption of the liquid parts. The cartilages covering the condyles of the femur and heads of various bones are often coated with a thin layer of lithate of soda of the purest white, and of the consistence of very soft plaster, there being at the same time no similar deposit on any other surface within the joint. When this substance has acquired a considerable degree of hardness, the cartilages become absorbed, and the new surface sometimes exhibits grooves which seem the effect of friction. In such cases the functions of the joint are permanently injured ; sometimes anchylosis follows ; but if the deposit be very considerable (as in joints of the fingers), dislocation is the more common result. These effects are most frequent in joints of the hands and feet, for the plain reason that these are more subject to gout than others ; but concretions have been found on the pericranium, cartilages of the ear, and in many other situations. When the irritation of a concretion has caused ulceration, very large quantities of lithate of soda continue to be secreted from the surface of the

cavity after entire separation of the concretion. It has been stated that these concretions are formed of lithate of soda ; a small proportion of phosphate of lime is always present ; and M. Cruveilhier has published the analysis of a concretion, in which the proportion of phosphate of lime was greater than that of lithate of soda. (*Anat. Path.* liv. iv.) Effusion of lithate of soda, in quantity to form obvious or palpable masses, is of rare occurrence in gout, and happens only after numerous and protracted fits. Sir C. Scudamore states, that in 206 cases of gout he did not discover any trace of concretions in more than 21,— a proportion rather above one in ten ; but as he does not mention in what degree the subjects of these cases had suffered from gout, no valuable inference can be drawn from the statement. We certainly should not infer, from the rareness of the concretions, that effusion of the lithate of soda is of rare occurrence in gout. That this substance is often poured out in quantity so small as to elude detection in the living subject, dissection has amply proved ; and, on the other hand, while it remains in a fluid state, there is no physiological obstacle to its absorption,—an event which would render concretions of palpable size comparatively rare. The effusion of lithate of soda in various parts is a circumstance so peculiar to gout, and is in many cases so obviously an essential part of the disease, that there can be no doubt of its being an important element in all. But we have seen that it is also common for gouty persons to pass an excess of lithates in their urine, in the intervals of gouty paroxysms; and that these persons are more liable than others to gravel and calculus of lithic acid origin. However we may abstain from raising a theory of the proximate cause of gout on the foundation of these facts, yet we must consider the discharge from the blood, at various outlets, of so large a quantity of such a highly animalized principle, as a fact of paramount interest in the pathology of gout, especially when viewed in connexion with those habits of life which we shall hereafter show to be a main cause of gouty diathesis.

Having already shown that the lithates are not formed by the act of secretion, but merely separated from the blood, the discharge of them in such large quantity in gout, (especially during the paroxysm) proves that in this disease the blood must be charged with great excess of them, and further shows that the paroxysm is, in one sense, a depurating process. Such vitiation of the blood with excess of lithates must tend to injure the functions of many organs ; and when we reflect on the removal of ailments, which usually follows the elimination of these principles in the paroxysm, we do not outstep the bounds of cautious inference in considering accumulation of them in the blood as the probable cause of those various and anomalous ailments which often precede the paroxysm, and as intimately connected with the cause of regular gout itself. As in some other febrile diseases there must also be excess of lithates in the blood, (as proved by elimination of them in unusual quantity), it is probable that the cause of gout is the presence, in that fluid, of some kindred but more specific principle. It may be objected to these views, that a full paroxysm sometimes comes on without precursory symptoms ; but to this it may be answered, that in diseases of which contamination of the blood is the sole cause, precursory symptoms occur in some cases, and not in others, although such contamination exist a considerable time before the developement of the disease. That gout sometimes follows local injury is no objection, for the fact that this is not constant, implies a predisposition.

We now proceed with the anatomical characters. The muscular tissue is never primitively affected with gout. When a joint has been a long time anchylosed, the muscles which formerly moved it dwindle for want of use ; and the texture of muscles may suffer much damage in consequence of repeated gouty inflammation of their aponeuroses. Ligaments and tendons lose much of their elasticity through frequent attacks of gout, and often remain habitually sore. Gout very seldom causes suppuration ; we have never seen an example of it. Sir C. Scudamore states that he has seen it in four cases, and, in all, the

result was curiously modified by attendant secretion of lithate of soda. Pathological anatomy has done nothing for gout of the viscera ; no effects of gout on the pericardium, or on the internal membrane of the heart, are recorded. Gouty inflammation of the stomach is not questionable, and is often fatal ; yet we possess no good description of its morbid anatomy. We have examined after death but one case of this affection. The appearances were peculiar and difficult to describe, and our notes of it are very imperfect. It would be interesting to ascertain whether there be, in these cases, effusion of lithate of soda into the cellular coat of the organ.

Almost every organ has been named by authors as the occasional seat of gout, and every ailment of gouty persons has been attributed to this Proteus. It is almost needless to add, that much which has been written on this subject is extremely fanciful, and has not been submitted to the test of a sound pathology. What are the viscera that are liable to gouty inflammation, is not yet determined ; although it is obvious that the functions of all may suffer from that contamination of the blood which is probably the most important element of the gouty diathesis. Gouty inflammation of the kidney has been described with some appearance of truth ; it is, yet, however, matter of doubt, whether the symptoms of this affection should be referred to gouty inflammation, or to such modification of the urinary secretion as is most likely to result from the gouty diathesis. For a very full account of the inflictions, real and supposed, of anomalous gout, the reader is referred to Stole (*Dissertatio de Arthritide*), Musgrave (*De Arthritide Anomalâ*), and to the *Dictionnaire des Sc. Médicales*, art. GOUTTE.

Causes. The circumstance of being the offspring of gouty parents is of great influence in predisposing to gout. Sir C. Scudamore (from whose elaborate treatise we must here borrow largely) found, that of 189 patients taken indiscriminately, there were 105 whose father or mother, or both, were subject to gout ; the remaining 84 were born of parents free from gout, and not allied to it by family. Now, if the children of gouty persons were not more subject to gout than those of persons not gouty, 105 to 84 would express the proportion which the former class bear to the latter ; but it must be evident to every one, that even in that class of life in which gout is most frequent, gouty persons are a small minority,—a fact which, contrasted with the numbers 105 to 84, showing the proportion of cases of hereditary to those of acquired gout, demonstrates the vast influence of hereditary predisposition. This is also further shown by particular examples, of which many striking ones might be adduced.

Sir C. Scudamore has related some curious instances, in which nearly all the members of a family have suffered from gout, although the parents and other relatives were entirely free from it. He states, that in one family, three brothers and a sister, out of six children, have been severely affected ; and that in another, also consisting of six, four brothers have suffered from very aggravated gout, and the two sisters only have escaped. In these examples the disorder was not known in the two preceding generations. These facts are deserving of notice.

The immunity from gout enjoyed by women is very notorious. We shall see that this is probably merely the expression of a more general fact, namely, that persons of temperate habits are, with few exceptions, exempt from this disease. Menstruation, and the natural temperament of women—much less sanguineous than that of men—may also have some share in procuring this happy immunity.

Examples of gout occurring before puberty are exceedingly rare, and the few which have been cited do not appear to be well authenticated. Gout is, indeed, rare before the age of thirty. Sir C. Scudamore has noted the period of first attack in 209 cases.

It occurred before the age of 20   in 4 persons only.
—   between the ages of 20 and 30—63 persons
—   —   30 — 40—78
—   —   40 — 50—43
—   —   50 — 60—16
—   —   60 — 70— 5
                                          ———
                                          209
                                          ——

Bearing in mind that the number of persons in existence decreases rapidly as age increases, the very great liability to gout in persons between the ages of 30 and 40 becomes obvious. Persons between 40 and 50 are, probably, quite as liable to the accession of gout as those between 20 and 30. After 50, the liability decreases rapidly, but even persons between 60 and 70 are very much more liable to have gout come on, than those under 20. Sir C. Scudamore has not met with gout coming on, for the first time, after the age of 66. Thus it appears that gout usually comes on soon after the growth of the body is completed, and while the function of nutrition is yet in full vigour. Authors seem to have no doubt that a particular form of body predisposes to gout, and some have described the "gouty form" with great minuteness. No one however has determined the proportion of persons of such form to those of different shape, and therefore speculations upon it are without value. The opinion that sexual indulgence is a cause of gout is probably still more fanciful.

Habits of life furnish the most important considerations connected with our subject, for we shall see that, without the co-operation of causes arising in certain habits of life, all the circumstances hitherto enumerated remain without power to produce gout. Several influential circumstances prevail in the mode of life of gouty persons; namely, high feeding, especially great consumption of animal food, habitual abuse of spirituous liquors, and sedentary habits. The first two are more constant and undoubtedly more influential than the last, which may be considered of a more negative character. These several circumstances appear in a stronger light when contrasted with the habits of a class who may be said to be entirely exempt from gout; we allude to agricultural labourers: these men are, from necessity, sparing in the use of animal food, habitually temperate, and all day long work hard in the fields. During a long and extensive profesional connexion with a large rural district, we never knew an instance of gout among agricultural labourers, who of course form the great mass of the population; gout was not uncommon among tradesmen, but still more frequent in the class of gentlemen and opulent farmers.

That the quantity of animal food consumed by agricultural labourers is comparatively very small, must be well known to persons who have lived in the country; and we believe this circumstance has considerable share in procuring for that class their signal exemption from gout. It is nearly established that large consumption of animal food tends to produce the lithic acid diathesis: a condition so often associated with gout that more than one author has been led to consider these forms of disease as essentially connected. In advancing the opinion that large consumption of animal food is a cause of gout, we are glad to avail ourselves of the support of one of the most distinguished physiologists of our day. Müller, in commenting on Magendie's experiments on food, says, "These experiments have thrown some light on the causes and mode of treatment of gout and calculous disorders. The subjects of these diseases are generally persons who live well, and eat largely of animal food: most urinary calculi, gravelly deposits, the gouty concretions, and the perspiration of gouty persons, contain abundance of uric acid; a substance into which nitrogen enters in large proportion. By diminishing the proportion of azotized substances in the food, the gout and gravelly deposits may be prevented." An elderly country practitioner has assured us, that, forty years ago, gout was much more

frequent among farmers and tradesmen than at present : he is of opinion that men in these classes drank more freely then than now, and to this difference he ascribes the greater prevalence of gout at the period referred to.   This greater prevalence of gout formerly has been averred to us by so many of credit and observation, that we have no doubt of its reality.   Allowing that free drinking was more common in those times, we must also remark the important fact, that vegetables were scarce and dear, and that meat formed a much larger proportion of food than at present.*

Abuse of malt liquors and wine is so commonly associated with the love of good cheer generally, that it is difficult to form a separate estimate of its influence as a cause of gout.   This influence is real and probably considerable, and we are disposed to think that malt liquors tend, even more than wine, to produce a gouty diathesis.   Their effects are especially manifest in those examples of gout which occur in the lower classes.   There is a body of men employed on the Thames whose occupation it is to raise ballast from the bottom of the river.   As this can be done only when tide is ebbing, their hours of labour are regulated by that circumstance, and vary through every period of night and day.   They work under great exposure to inclemencies of weather ; their occupation requires great bodily exertion, occasioning profuse sweating and much exhaustion.   In consideration of this, their allowance of liquor is very large ; each man drinks from two to three gallons of porter daily, and generally a considerable quantity of spirit besides.   This immoderate consumption of liquors forms the only exception, as far as relates to food, which these men offer to the general habits of the lower classes in London.   Gout is remarkably frequent among them, and although not a numerous body, many of them are every year admitted to the Seamen's Hospital Ship affected with that disease.   This is a very interesting fact, and seems to show that no amount of bodily exertion is adequate to counteract the influence of such large doses of porter ; the exposure of ballasters to wet and changes of temperature probably favours its operation. These men are almost all derived from the peasantry of Ireland ; they can rarely, therefore, inherit a disposition to gout.

All the tradesmen we have met with affected with gout, have been known to us for their intemperate habits, and especially their abuse of malt liquors ; a very large proportion were innkeepers.

The abuse of wine has been considered in all times one of the most efficient causes of gouty diatheies, and there is ample reason to confide in the truth of this opinion.   Wine probably acts in the same way as malt liquors : the strongest wines, such as port and madeira, are considered to be the most powerful in producing a disposition to gout ; while, on the other hand, it is supposed that in persons who have had gout, sour and light wines, especially champagne and claret, more readily bring on the gouty paroxysm.   We shall see that in the quality of an exciting cause, the abuse of wine holds the foremost rank, and this probably first led to its recognition as a general cause of gout.

The effects of spirits cannot well be separately treated of : it seems probable,

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* We have before us an account-book bearing date from the middle to the latter end of the last century, and in it we find some interesting entries of the comparative prices of meat and vegetables.   The prices for a long period run as follows :—*Quarter of a sheep*, two shillings ; peck of potatoes, sixpence.   In the same districts, at present, potatoes are often only threepence a peck, whereas mutton is sixpence a pound, and sometimes more.   The gentleman who gave us this account-book, and who is now more than seventy years old, informs us that when he was young, no potatoes were kept for winter use, and that the only other sort of garden stuff used was a coarse kind of kale, the leaves of which were stripped off the stalk, and prepared for the table by plain boiling.   This vegetable was tough and unpalatable ; and during four or five winter months the food consisted, almost exclusively, of meat, bread, and flour puddings.   The change which extensive cultivation of the potato and diffusion of gardening has wrought in the nature of the food of the population generally, is renarkably great, and well deserves the attention of physicians.   (See SCURVY.)

that when drunk exclusively they do not powerfully predispose to gout: gouty patients assure us they are much more safe from their enemy in the habitual use of gin and water, than when taking an equivalent of wine or malt liquors.

We have endeavoured to estimate the influence exercised by abuse of liquors separately from that of other indulgences of the palate. In reality, however, they are generally found together; and in habitual indulgence in the pleasures of the table considered in the aggregate as constituting good cheer, we see a cause more prevalent than any other,—a cause recognised by physicians in very early times, and undisputed in our own. No truth is established on a surer foundation than this; that habitual indulgence in pleasures of the table brings on gout, and abstemiousness, temperance, and active habits preserve from it. The fact is striking, and is well exemplified by the almost complete immunity of females, and, as we have said before, by the total exemption of agricultural labourers and young persons. We do not, however, mean to stigmatize all gouty persons as intemperate. We have already amply shown the influence of hereditary predisposition, and this may be so strong that gout may come on without the co-operation of indulgences which can be accounted culpable. Of this, our own experience furnishes many instances.

Great bodily exercise, by producing expenditure of power, by rendering assimilation more perfect and excretion more complete, sanctions the use of a large quantity of food, and may even counteract the ill effects of occasional excesses at table:—sedentary habits, on the contrary, do not furnish any one of these motives for a large supply of food, and, by inducing repletion, probably favour the operation of those causes which we have just been considering. The discovery that many excrementitious principles are not formed in the organs through which they are discharged, but exist already in the blood (probably as a residue of assimilation), has given additional interest to the functions of excretion, and has shown the importance, in regard to the purity of that fluid, of promoting these by appropriate habits. The skin has important functions of this kind, and in transpiration and sweating offers an outlet to highly animalized excrementitious principles;—a still larger portion passes off by the kidney. The efficacy of bodily exercise in promoting the proper discharge of these functions is well known; and it seems probable that to this quality more than to the prevention of plethora, may be ascribed its success as a means of protection from gout.

We now come to treat of *exciting* causes. The most common of these are indulgence in pleasures of the table, and especially abuse of wine or spirituous liquors; the use of stimulant mineral waters; local violence, such as a bruise or sprain, or violent exercise of a part; exposure to cold and moisture; and when the gouty diathesis is rife, any circumstance which excites fever or in any way disturbs the health of the patient: in this way excess in venery may possibly be an exciting cause of a paroxysm, but it is in nowise a cause of the gouty diathesis. As striking examples of the immediate effects of abuse of wine, Sir C. Scudamore gives the case of a person, neither descended from gouty parents, nor having reason to expect such a disease, who, after three or four days of excessive conviviality, in which he drank champagne very freely, was seized severely with the gout. In another individual, of a temperament bordering on the pure sanguineous, with a circular chest and large veins, not born of gouty parents, after committing the extraordinary excess of drinking four bottles of port wine at a sitting, was seized the same night, and for the first time, with the gout. Three persons sat down to a convivial dinner with scarcely the sensation of gout, but on rising to depart, the feet were completely disabled by the inflammation and swelling, which had made rapid progress. (*Treatise on Gout*, pp. 101, 102.)

In the last century, when a fit of gout was considered a cure for every ailment, and the doctrine had become popular, because it countenanced the most cherished habits of good livers, physicians had very extensive experience of

the effects of mineral waters as an exciting cause of gout : they all agree in ascribing considerable power to their use, and the waters of Bath, in particular, acquired great celebrity.

A gouty paroxysm is frequently the consequence of severe local injury ; but, in advanced cases, unusual exertion in walking is often sufficient to excite a paroxysm. One of our patients has been visited with a severe fit of gout in several successive years, manifestly excited by considerable exertion in the pursuit of his favourite diversion, partridge shooting.

The influence which local violence, long previously sustained, has in determining the seat of gout, is interesting. We are acquainted with a gentleman, who, when young, sprained his ankle severely ; many years afterwards he experienced his first attack of gout ; that part only was affected then, as well as in the two or three following fits.

Sir C. Scudamore relates a similar instance, and another still more interesting, of a gentleman, who, when a youth, accidentally received some small shots from a gun in one knee. They were removed, but the knee was rendered permanently weak in a slight degree ; and to this part the gout in after life first attached itself, and always afterwards with more severity than in any other situation. In scurvy, also, facts exactly analogous to these are observed ; a circumstance which imparts to them additional interest for the pathologist.

Gouty persons are remarkably sensible to the influence of cold and damp : we know many who invariably suffer twinges of gout after the slightest dampness of the feet, and even a full gouty paroxysm is often excited by this cause. We shall not pursue further the enumeration of exciting causes ; when the gouty diathesis is confirmed, any, even trifling, disturbances of the system, from whatever cause it arise, may occasion the developement of a paroxysm.

Treatment. The treatment of gout has been, and continues to be, subject to much caprice and prejudice. Many persons, having once found their health improved by a severe attack of gout, are led to consider the paroxysm exclusively in the light of a salutary process, which it would be unwise or even unsafe to interfere with ; others go still further, and, believing the relief to the system to be proportionate to the violence of the paroxysm, endeavour to promote the developement of gout by local warmth and an exciting regimen. But improved health is by no means a constant result of the gouty paroxysm : while on the other hand, the lamentable disorganization of joints which ensues when severe fits of gout are repeatedly allowed to take their own course, is a peremptory motive for the interference of our art. The great advantage of judicious medical treatment in severe attacks of gout is now fully recognised by the Profession, and persons who suffer from gout are daily becoming more sensible of it. The first fit of gout is usually so slight an illness, and tends so early to a favourable termination, that little interference is necessary, and indeed medical aid is seldom sought for ; when, however, the first fit is unusually severe, or gives indication of becoming protracted, those means should be employed which we shall now describe as applicable to a severe paroxysm in a more advanced stage of the disease. When the acute gout comes on in a person of full habit, and is attended with much fever and urgent local symptoms, direct depletion affords great relief, and cannot safely be dispensed with. In such circumstances, general bleeding should be had recourse to ; but it should be borne in mind that the object of bleeding is not to cut short the paroxysm, an effect to which it is inadequate, but to moderate fever, lessen the severity of local symptoms, and diminish repletion. These important effects may be attained by a prudent use of the lancet, and if nothing further be attempted, no bad consequences need be apprehended ; but profuse bloodletting, repeated without due regard to the resources of the patient, is a practice fraught with danger and bad consequences.* Purgatives are of great service

* There is some reason to believe that the old doctrine, that profuse bleeding favours metastasis to vital organs, is true as regards gout; and that this effect is one, though not the only, source of danger arising from such practice.

in the treatment, and no form of these is so eligible as blue pill, followed at the end of some hours by a common black draught. When the complexion and other appearances bespeak a bilious condition of the system, these medicines should be repeated several times at proper intervals : this treatment, in alliance with low diet and the use of diluents, materially alleviates the symptoms of gout, but is insufficient to accomplish a speedy cure :—fortunately, however, this may be safely completed by preparations of colchicum. The efficacy of this medicine in the cure of gout was known to the Greeks and Arabians ; and the Hermodactyl mentioned by Greek authors, and extolled as a remedy for gout by Alexander of Tralles, a city of Lydia, in the sixth century, has been ascertained to be the colchicum. In our own times there has been much difference of opinion as to the efficacy of this medicine ; for, while all have acknowledged its power, when first employed, to remove speedily the local symptoms, many have argued that the cure thus obtained is not permanent, but is followed by early and frequent relapses, and that in a short time the drug seems to lose all control over the course of the disease. Notwithstanding this impeachment of its virtues, colchicum has continued to advance in favour as a remedy for gout, and counts among its advocates the best and latest writers on the subject, among whom we may mention Scudamore, Halford, and Barlow. Sir H. Halford states that he has never known a single instance of untoward effect from its use, and affirms that gout does not return more quickly after its use, than when treated by other means or left to its own course. As far as we have observed, it is only when colchicum is used to the exclusion of other means, without observance of proper diet, and left off on the first subsidence of local symptoms, that gout returns more quickly after its use. In persons of very full habit, in the height of a febrile paroxysm, direct depletion accomplishes what cannot be effected by other means, and it ought not, therefore, to be superseded. It is certainly not by depletion that colchicum cures gout.

When the fever and local symptoms are not urgent, and especially when direct depletion is for some reason inadmissible, we may have recourse to colchicum in the first instance. The cure obtained by it will be speedy in most cases, and if the remedy be long enough continued, as permanent as if effected by any other means. We shall now make a few remarks on the usual physiological effects of colchicum, as these effects will be found to suggest some important rules for its use. When the wine of the root is given in large doses, it occasions violent vomiting and purging ; the stools are copious, watery, and attended with much griping ; the vomiting occurs at short intervals, and there is much nausea and sense of load at the stomach, with distressing faintness and sinking. In some cases there is a marked diminution in the frequency of the pulse, which is also faltering and occasionally intermittent. We have frequently observed these distressing symptoms in persons ill of acute rheumatism, and taking 3ss of the wine three times a day. In smaller doses, colchicum acts as diuretic, and promotes perspiration ; it sometimes purges moderately, but rarely produces diminution in the frequency of the pulse. In a long series of careful observation on the subject, we never remarked material diminution in the frequency of the pulse, except in connexion with the more violent effects already described ; and we believe the effects of colchicum on the pulse have been much overrated. From these observations it appears, that the caution to be observed in the employment of this medicine regards chiefly its effects on the stomach and bowels, as it seems probable that, if allowed to produce violent irritation there, gouty inflammation might thereby be determined to these organs. We have knowledge of one instance in which this seemed the result, and the issue was fatal. The most striking symptoms in that case were, uncontrollable vomiting and purging, followed by early and profound collapse. When, therefore, distressing nausea or violent purging supervenes, colchicum should be left off until

these effects have ceased. On returning to its use, it will be prudent to employ a smaller dose than before. We also approve of Sir H. Halford's precept, —that in the common circumstances of gout in the extremities, colchicum should not be used at first, but that we should wait a day or two until the malady shall have fixed itself. We need scarcely add, that the presence of symptoms of gout in the stomach entirely contravenes the use of colchicum by the mouth, and that profuse diarrhœa is also a counter-indication.* It has been argued by many, and very forcibly by the late Dr. Sutton, that colchicum cures gout by its purgative effects; but this statement is disproved by the experience of all who have much employed this medicine, for it often cures without producing sensible increase in any of the excretions, and, according to our own experience, its beneficial effects are quite as soon shown under these as under any other circumstances. On these grounds, we do not see why Dr. Barlow and Sir C. Scudamore should have denied to colchicum a specific action. The wine of the root of colchicum is as good a preparation as any; twenty-five drops, twice a day, in cinnamon water, may be given at first, and if it agree with the patient, may be increased to thirty. We have never found it necessary to carry the dose beyond this. When there is acidity in the stomach, fifteen grains of carbonate of magnesia may be given with each dose, and is indeed always a safe and perhaps good addition. These doses of colchicum generally produce moderate purging and increased secretion of urine; effects which must undoubtedly be considered salutary. Under this treatment the local symptoms soon abate, fever subsides, and the general condition of the patient rapidly improves; often, in a few days, convalescence is fully established. But it is necessary to continue the medicine for many days after entire cessation of symptoms; the doses may, however, be diminished, and the intervals between them lengthened. We have learned from experience the great importance of this rule, and it is explained by those views on the pathology of gout, which show that removal of the local symptoms and attendant fever is far from equivalent to complete cure. This continuance in the use of colchicum is, moreover, never attended with ill effects. In cases in which the stomach is irritable, colchicum should be given at first in small doses, and its best vehicle is a common effervescing draught; when it has a tendency to purge too freely, this may be counteracted by the addition of a small quantity of tincture of opium to the evening dose.

Sir C. Scudamore prefers the Acetum Colchici to all other preparations. The following is the formula he recommends:—R. Arcetici Colchici, ʒj ad ʒij; Magnesiæ, gr. xv and xx; Magnesiæ Sulphatis, ʒi ad ʒij; Aquæ puræ, ʒiss. Fiat haustus.

This draught to be given every four, six, or eight hours, according to the freedom of its operation and the urgency of the symptoms. Sir H. Halford recommends the wine of the root. He states that, so far from finding it prone to purge the body, as the eau médicinale often did, he generally finds it necessary to add a small portion of sulphate of magnesia.

The diet in acute gout must be much the same as in other febrile diseases. While there is much fever, the patient must be restricted to the use of diluents: rennet whey, toast and water, and weak tea, are generally relished. There is no objection to the moderate use of oranges, grapes, or roasted apples, provided there be no acidity of stomach, and they do not increase too much the purgative effects of colchicum.

* It seems to us, however, that it is eminently desirable, even in these cases, to introduce colchicum into the system by some means or other. In case the stomach were affected, and diarrhœa not present, we should be much disposed to try the effect of colchicum in enemata. In cases attended with vomiting and purging, administration of veratria by the endermic method is well worth trying, for in such cases the means in present use so commonly fail, that it is incumbent upon us to try any that give fair promise of success.

The return to a more nourishing diet, should be commenced with farinaceous food.

An attack of gout is, generally, so soon relieved by the means described, that there is no need of local treatment. Gout is also so shifting in character, that local treatment promises much less advantage than in simple inflammation. We object therefore to the practice of applying leeches to the gouty limb, partly on the ground of its being needless. Those who have had the most experience of this practice in our own country state, that it often promptly relieves the affected part, but that it produces great and lasting weakness of the joint, and that the relief of the extremity not unfrequently seems the occasion of gouty inflammation of the stomach, or some other important organ. The application of leeches may, however, be sanctioned by unusual continuance of violent inflammation, in spite of judicious general treatment. We have employed them in a few instances, and in these they soon relieved the local affection without producing untoward consequences. It is proper to state that local bleeding is much extolled by many French authors of good repute.

It is, we believe, sufficient in all cases merely to cover lightly the gouty part, and relieve it from the weight of bed-clothes. The prevalent custom of wrapping it in flannel is very pernicious; the unnatural heat of the part is thereby increased, and much relaxation and weakness result from the copious local transpiration it occasions. We have had no experience of the method of local evaporation, so strongly recommended by Sir C. Scudamore; but as he states that it has given signal relief in 130 cases in which he has tried it, and not once produced any unpleasant effects, we give an account of his method for the use of those who may be disposed to try it. It consists in applying to the gouty part linen rags wet with a lotion (lukewarm,) composed of one part of alcohol and three parts camphor mixture. The linen compresses, constantly kept wet with the lotion, should consist of six or eight distinct folds, one laid upon another; and the lightest and coolest covering only used in addition. When the lotion is discontinued, the part should be wrapped in a single layer of flannel. The best method of applying the lotion to the knee and elbow is in a bread poultice saturated with it, and laid on thick and lukewarm.

We cannot warn our readers too strongly against the irrational and dangerous practice of repelling gout by immersing the affected parts in cold water.

In the convalescence of gout, the diet should be light and simple, and the bowels kept regular by the use of a mild warm purgative. Exercise of the parts which have been affected should be attempted gradually: its measure will, in general, be best indicated by the feelings of the patient, who should however be warned against the danger of excess, which almost certainly brings on a relapse. Moderate exercise should not be too long deferred, as, by promoting the absorption of effusions, it tends more quickly than any other means to remove stiffness and weakness. When capsular effusions persist, moderate friction with the hand is very beneficial: a well-applied bandage is also of great use, especially when there is œdema. The patient should be very cautious of early exposure to cold.

In chronic gout, the treatment must of course be much less active. Direct depletion is very injurious, as in this form of the disease,—generally the sequel of acute gout,—there is usually much constitutional debility. This may have proceeded so far as to furnish the leading indication of treatment: the countenance may be blanched, the tongue pale and indented, the pulse weak, the breathing short on the slightest exercise, and the heart palpitating. In such cases the affection of the joints has a much less inflammatory character than in acute gout, is more wandering, and often alternates with pains of the stomach like gastrodynia, and anomalous pains of the head and other parts. In these circumstances, tonic medicines and generous diet are of the greatest

service. Preparations of iron are generally to be preferred to other tonics, and tincture of muriate of iron is an eligible form : its object may be promoted by the daily use of two or three glasses of good sherry. The good effects of Bath waters in this form of gout (the atonic or anomalous gout of authors) in some measure justify the high reputation in which they were once held. In acute gout these waters are invariably injurious. Under the treatment just described, it generally happens that the body is invigorated, the internal parts are relieved, and gout settles in the extremities, assuming a more frankly inflammatory character. When this desirable object is attained, the remedies may be more specially directed to its cure, and preparations of colchicum, given with the precautions already enjoined, produce admirable effects : in cases of this kind we have found camphor mixture an excellent vehicle. In chronic gout, unattended with much debility, our chief reliance is to be placed on colchicum, which should be continued for some time after apparent cure is accomplished.

If the secretion of bile be defective, or the complexion sallow, blue pill followed by a mild purgative draught should be occasionally given. The diet too must consist chiefly of farinaceous food : a small portion of wine may be advisable when the patient has been accustomed to take it freely.

In protracted chronic gout, where the joints are very stiff and weak, the gouty diathesis confirmed, and the health much broken, the use of mineral waters is sometimes remarkably successful : the relief from local stiffness and weakness is, in particular, very striking when thermal waters are used locally by affusion and in the form of warm baths. The waters of Aix-la-Chapelle, of Wiesbaden, and of Carlsbad, enjoy great reputation.

The presence of gouty concretions may require some modification of the usual local treatment : on this point we shall again quote the excellent paper of Mr. James Moore :—" The shocking appearance of a severe fit of gout when it attacks a part in which there is an accumulation of chalk, has already been noticed. In this situation a warm poultice is a far better application than dry wool or flannel. If there is any tendency to gangrene, the poultices ought to be of the cordial kind, into the composition of which porter, wine, or opium, should enter. If the cutis opens, yet leaves the chalky effusion confined by the cuticle only, a puncture should be made. It is imprudent to touch with a lancet the organized cutis, or even to make a large opening into the cuticle to expose parts in so precarious a state. Even a small puncture will permit some portion of the fluids to escape, and more will run out into the poultice. The tension is then removed, and the symptoms commonly improve. After the violence of the fit has subsided, an ulcer frequently remains with chalk in the bottom, which renders it extremely difficult to be healed. It is bad practice to attempt to remove the chalk by the knife, for a wound might occasion a renewal of gout, or at least a great deal of inflammation ; and as the chalk is a solid substance, and dispersed in separate cells, very little could be removed by the incision. Caustics employed with caution answer better. We may add, that when gangrene does take place, the yeast poultice is the best application that can be used."

In retrocedent gout, the relief of the suffering organ must be attempted by remedies which affect it primarily, and by others which tend to recall the gouty inflammation to the extremities. The means best calculated to attain the latter object are hot stimulating pediluvia or sinapisms, or both. Those which may be employed to fulfil the former, must vary in some measure with the organ which suffers, and with the degree and character of the symptoms. When these are of an inflammatory kind, as happens when they have succeeded to acute and well-marked inflammatory gout of the extremities, those measures must be adopted which are known to be most efficacious in quelling common inflammation of the suffering organ. When the stomach is affected, and the symptoms are of the kind referred to, local bleeding must be freely employed ; and if there

be much pain, and incessant vomiting, as generally happens, opium must be given in full doses, and an effervescing draught is its best vehicle. In such cases we object to the use of more direct stimulants, unless there be alarming collapse. In the gouty affection of the stomach, which often alternates with that of the joints in chronic gout, and which is remarkably painful, and of the character of gastrodynia, stimulants are invariably successful. We have given, with uniform advantage in these cases, an ounce of tincture of rhubarb in one dose, allowing at the same time a pretty free use of brandy and water. But in all cases of retrocedent gout, in which the symptoms are urgent, it is right to attempt to recall the gout to the extremities by suitable means, before adopting more vigorous measures, since if we succeed, in the first instance, the relief to the internal parts will be complete, and the patient will be spared much painful and hazardous discipline.

Prevention. We have seen that the chief causes of gout, setting aside hereditary disposition, are free living and sedentary habits; it follows, therefore, that the surest means of prevention are temperance and active exercise. When hereditary tendency is present, temperance especially should be strictly observed, and a preponderance of vegetables in the habitual food is also advisable. In short, those threatened with gout should imitate, as far as practicable and consistent with comfort, the habits of agricultural labourers. The application of these principles must be rigidly enforced when the occurrence of an attack of gout has already declared the existence of gouty diathesis. Field sports furnish admirable exercises for the higher classes, and are advisable in all cases in which gout has not injured the structure, or impaired the functions of joints. Perseverance in temperate and active habits will often wholly preserve from further attacks; but if it fail in this, still their frequency will be lessened, and severity much diminished. Much less can be done by the use of medicines. When, however, premonitory symptoms appear in persons who have had gout, the impending paroxysm often seems averted by a dose of blue pill followed by a mild draught of sulphate of magnesia and senna, and the observance of a low diet for a few days. We have seen this a great number of times in one of our patients, when the symptoms of impending gout have been of the most characteristic kind. Sir H. Halford states, that in regard to medicine he has had "incomparably the most satisfaction in giving a few grains of rhubarb and double the quantity of carbonate of magnesia every day, either at bedtime or early in the morning; or, under evident weakness of the powers of digestion, half an ounce of compound tincture of rhubarb with fifteen grains of the carbonate of potash in some light bitter infusion daily, before the principal meal."

When the joints have been crippled by repeated and prolonged attacks, little can be done in the way of prevention, especially as exercise is impracticable, and the gouty diathesis deeply rooted. Here a warm climate seems to promise more advantage than any thing else. Haller and Van Swieten relate striking examples of success obtained by a few years' residence in the West Indies. Rome is a good European residence for gouty persons; and Sir J. Clarke states, that Genoa is remarkable for the rare occurrence of the disease among its inhabitants. In the cases referred to, we strongly object to the practice of entirely withholding wine or other stimulants from persons who have been long accustomed to their use. The prospect of benefit to the gout from this practice is very uncertain; and it will be found that the patient is afterwards constantly ailing, and deprived of all comfort, if, indeed, no worse consequences ensue. Where indulgence in wine has been excessive, the supply of it may be restricted with advantage.*

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* Since this article was written, Dr. Holland's admirable volume of *Medical Notes and Reflections* has fallen into our hands. In the chapter on gout and colchicum, we were much pleased to see developed, with great ability, views similar to many advanced in this article, especially as regards the nature of gout, and the use of colchicum. The reader will find, in Dr. Holland's chapter, some ingenious and valuable speculations on the hereditary succession of gout; on wine, as a cause of the disease; and on the operation of colchicum as a remedy.

WORMS FOUND IN THE HUMAN BODY.

Parasites.—Origin of Worms.—Causes.—Seat.—Symptoms, local and constitutional.—Morbid appearances caused by worms.—General treatment.—Classification of worms.—Particular species.—Acephalocystis endogena.—Acephalocystis multifida.—Echinococcus hominis.—Cysticercus cellulosæ.—Animalculi echinococci.—Diplosoma crenata.—Tænia solium.—Bothriocephalus latus.—Distoma hepaticum.—Polystoma pinguicola.—Trichini spiralis.—Filaria Medinensis.—Filaria oculi.—Filaria bronchialis.—Triocephalus dispar.—Spiroptera hominis.—Dactylius aculeatus.—Strongylus gigas.—Ascaris lumbricoides.—Ascaris vermicularis.

It would appear to be a principle in the economy of Nature, to which perhaps few exceptions will be found, that every species of animal, either during life or after death, shall be subject to the depredations of some other species.

The final purpose to be served by such a law, in providing for the removal of dead animal bodies by the reconversion of their decomposable materials into living structures, appears to be of a twofold nature; first, to prevent the injurious consequences which would result to living species from the extrication of noxious gases accompanying chemical decomposition ; and secondly, which is of far higher importance, to provide a supply of matter already organized, and therefore capable of being more readily assimilated to the textures of those animals which are destined to feed upon it; for by this means the organic particles of decomposing animal bodies are rescued, as it were, in their transitorial stage, and brought back again to life, before opportunity is afforded for them, in the ordinary course of chemical decomposition, to pass over to the mineral kingdom.

But the occupancy of living bodies by parasites presents us with a more remarkable and less understood feature in the law of predation, one indeed for which it is difficult to find a satisfactory explanation, unless we regard it as a provision, by which the stronger and generally more highly organized species are destined to afford protection and nutriment to the weaker ; a provision which, while it in some measure tends to counterbalance the more ordinary rule of the weaker yielding to the stronger, at the same time contributes to fulfil another recognised principle of Nature, that " every situation which is capable of supporting living beings shall be peopled with them."

But whatever may be the final cause, it is an admitted fact, that almost every species of animal is liable to be infested by its peculiar parasite or parasites, which are developed in and protected by its various textures, and draw their sustenance from its juices, while man is so far from constituting an exception to the general rule, as to be subject to a greater number of parasites than any other living being.

Some of these are limited to the surface of the body, and cause but slight inconvenience ; others penetrate the skin, and produce more or less irritation ; while the greater number occupy the internal parts, and give rise to symptoms varying in character and intensity, according to the nature and position of the parasite.

The frequency with which these parasites occur, and the variety of disorders which accompany their presence in the human body, demand for this subject

the attention of every medical practitioner. It is not, however, our intention to
describe every species of parasite which has been discovered in or upon the
human body. The external parasites require little or no attention from the
practitioner; while of the internal, many, such as the larvæ of numerous insects,
are of only occasional occurrence, and their presence must be considered acci-
dental. But it is to those genera and species whose fixed and frequent occur-
rence in the human body entitles them to be considered as the peculiar parasites
of man, that our observations will be mainly directed, still, however, not ex-
cluding others, which, though of rare occurrence, nevertheless are clearly
entitled to be associated with them.

These internal parasites, to which the term *Entozoa*, or the more familiar one
of *Worms*, has been generally applied, we propose to treat of under the follow-
ing subdivisional heads: 1, the origin, causes, and seat of worms; 2, the
symptoms and morbid changes which accompany their presence; 3, their treat-
ment; 4, their classification; and lastly, under the head of each separate genus
or species, will be given such particulars in relation to their characters, struc-
ture, symptoms, and treatment, as may appear most conducive to a practical
knowledge of the subject.

Origin of worms. This is a point upon which much difference of opinion is
found to exist among helminthologists, for while some adduce the entozoa as
presenting examples of spontaneous or equivocal generation, others contend for
their external origin in all cases, while others maintain a somewhat intermediate
position, and, allowing the origin of the entozoa in distinct ova, contend that
these are transmitted from the parent to the fœtus in utero, through the medium
of the circulation. It would not accord with the objects of a practical work to
enter at any length upon a question involving so much speculation; but a few
of the more important points, which have been advanced, may be noticed.
Those who contend for an internal origin, whether by spontaneous production,
or by the developement of transmitted ova, consider that this view is supported
by the fact, that while the number of known entozoa is very great, yet that each
species is for the most part limited to particular animals, and appears in no
others, thus presenting an uniformity in this respect, which it would be difficult
to reconcile with the notion of a promiscuous external origin. That the struc-
ture of the entozoa is such as renders them fit to inhabit only such situations as
the bodies of the animals in which they are found; that their frequent existence
in various structures of the body, having no external communication whatever,
negatives the idea of an outward source; and that their occasional occurrence
in the unborn fœtus must remain equally unexplained, unless either their inter-
nal or spontaneous origin be admitted.

On the other hand is to be noticed the singular fact, that many of the entozoa
are remarkable for the great developement of the reproductive organs, many
possessing distinct sexes, and most of them true ova, which it is not difficult to
imagine would become developed in those situations and those only which would
afford them an appropriate nidus, while no purpose would appear to be answered
by the possession of an extensive generative system in an animal capable of
spontaneous developement. The singular fact also that individuals visiting
articular countries may become infested by the species of entozoa peculiar to
that country, has been repeatedly ascertained, and must be regarded as milita-
ting greatly against the idea of any other origin than an external one, at least
in those particular instances.

Some of these contending views might perhaps be reconciled by a more strict
limitation, or particularization, of the objects to which the general argument has
been applied; for the class entozoa contains animals, which in many instances
may be said to possess little or no character in common beyond the mere cir-
cumstance of their inhabiting the bodies of others. Some have well developed
and distinct organs for nutrition and reproduction; others consist of a more
solid parenchyma, in which these parts are as it were but sketched out in a
rudimental form; while others again, still more simple in structure, consist only

of a granular membrane, in which it is impossible to trace any of the structures possessed by the higher classes. With so great a variety of form and organization, it may well be supposed that there exists a corresponding difference in the mode of reproduction of the entozoa, sufficient to account for their presence in the various parts of animal bodies in which they are found, without having recourse to the idea of a spontaneous origin.

All those for example which are found in the alimentary canal may be supposed to have been introduced in the form of ova, which required only a suitable nidus for their developement; and their subsequent multiplication there is easily effected, whether their ova be the product of separate sexes on the same individual as in *tænia*, or in different ones as in *ascaris*. Nor can the possibility of an external origin be altogether denied to worms inhabiting any organ having an external outlet, though remote, such as the urinary or even gall-bladder. The subject becomes more obscure when we regard the occupancy of parts having no external communication, such as the cavity of the eye or the muscular or cellular texture, and that also by worms of considerable size.

It seems to us, however, that all these cases may be reduced to two conditions. We may suppose that there has been either a penetration of these parts from without by the parasites, or that their ova or germs, under whatever form, have circulated with the blood, and afterwards escaping from the general course of that fluid, have been deposited in the remote situations in which they are found.

In a subsequent part of this essay will be given evidences in favour of this power of certain species to penetrate textures. In the case indeed of the Guinea-worm, the evidence in favour of this power of penetrating to the cellular texture from without is so strong, as to have led many observers to adopt a thorough conviction of its external origin, and some even to believe in the possibility of its being communicated by contagion; and until these evidences can be set aside, there appears to be no difficulty in allowing an external origin to worms inhabiting even the globe of the eye, or similar positions.

On the other hand, in the case of those parasites which occupy positions that are clearly unattainable in this mode, they will be found to consist chiefly of those slowly organized genera, of whose mode of propagation, and of the nature of whose germs we know but little, and which are therefore not calculated to throw much light upon this question either way; or, as in the case of the minute *trichina spiralis*, the ova may fairly be supposed to be so small as to present no difficulty in reference to the notion of their circulating with the blood. It is not, however, so much our object to enter into the merits of an unsettled question in physiology, as it is to draw attention to those points, by a more extended examination of which it may be expected that the question will be ultimately set at rest.

Causes. The circumstances which favour the production of worms, no less than their direct origin, are involved in much obscurity. It would appear from the perfect adaptation of the entozoa to the peculiar situations in the bodies of the animals which they inhabit, that they are as much indigenous, so to speak, to those situations, as particular plants are to the particular districts or countries in which they are found; and that their germs, be they of whatever nature, are equally dependent for their developement upon certain external conditions, as are the seeds of a plant upon the nature of the climate, or the quality of the soil from which they spring. This analogy, indeed, would not inaptly furnish us with a guide to the investigation of the circumstances which favour the production of the entozoa, in so much as relates to locality, climate, season, and the like influences, as well as in considering the nature of the nidus and pabulum which are most favourable to their developement and growth.

With regard to the influence of locality and district, it has been distinctly ascertained that certain species are found in certain districts only, and in no others, but that individuals visiting those districts are as liable to be infested by

these particular worms as the native inhabitants, and may carry them away to other parts. This is the case, for example, with the Guinea-worm, which is not uncommonly found in certain parts of Africa and Asia within the tropics, and where the European resident becomes equally liable to it with the native inhabitants. It would even seem to prevail occasionally in an epidemic form, as appears from the account given by Sir James M'Grigor of the 86th and 88th regiments while resident at Bombay. The first of these regiments had continued quite free from the disease until the monsoon set in, when no less than 300 of the men were attacked by it; and, still more remarkably, the second, that replaced the first, and which after remaining two months at Bombay embarked, and were attacked while at sea to such an extent, that nearly half the men became affected.

The *tænia* and *bothriocephalus* also afford another striking example of the effect of climate, or district, in the localization of species. These two forms of tape-worm nearly resemble each other in general conformation, but differ in certain particulars, which will be subsequently noticed. The *bothriocephalus latus*, however, is met with only in Switzerland, Poland, and Russia; while in England, France, Holland, and Germany, the *tænia solium* alone prevails; and in those parts of France which border upon Switzerland the inhabitants are infested by both forms.

With regard to season and climate, as influencing the production of worms, there appears to be a pretty general belief, that a moist or damp atmosphere is favourable to the production of worms. If this be true, their greater frequency in Holland and Switzerland might be explained by reference to the humid atmosphere of those parts; and this accords with the observations that, in many of the fenny parts of England, the residents are much troubled with the *ascaris vermicularis*. Certain it is that, in many animals, the developement of worms can be distinctly traced to the influence of these causes, as in the case of sheep, which invariably become the prey of parasites if placed in too damp a pasturage; and the ancient observation of Hippocrates, that worms are more prevalent in autumn than at other seasons, might meet with a similar explanation.

So far then the production of worms in the human body appears to be influenced to a certain extent by the remote operation of climate, season, and locality. But the inquiry becomes the more interesting when we attempt to trace their origin to less remote causes. When we come to inquire how far their presence may be accounted for by reference to the nature of the food taken into the bodies of those animals upon which they are parasitic; and how far their well being in those situations most favourable to their developement and growth is to be accounted for by reference, on the one hand, to a pre-existing favouring condition of the parent body, or, on the other, to a state of constitution which, while it is that which is the most appropriate to the parasites, may have been in a great measure, if not solely, induced by its presence.

In reference to the first point, that is, the dependence of parasites upon the nature of the ingesta, it is clear that if we regard the origin of worms as in all cases external to the body, we should herein find the clue to their introduction in most cases at least; while it will be observed, that the subject loses all its practical interest in that view of it which attributes the origin of worms to a spontaneous production of them within the bodies of the animals which they inhabit; for so long as we believe in their external origin, we shall be naturally led to investigate the sources from which they may be supposed to be derived, and to seek the means of preventing their introduction. But it is to be regretted that none but very general observations have been made upon this point. Where the food taken is of such a nature as to be readily digested, and no more chyle is produced than is readily absorbed, there appears to be but little chance of the developement of worms; but the food being of an improper nature, and the powers of digestion inadequate to its due concoction, that state of the ali-

mentary canal is induced which, from the imperfect absorption of the chyle and the too abundant secretion of mucus, is the most favourable to the nutrition of the parasites. Hence the observation of Rudolphi, that children who eat voraciously of coarse bread and potatoes, and similar articles of food, are more liable to worms than those whose digestive organs are less oppressed. Hence Mr. Annesley observed that the Hindoos, who live almost entirely upon rice, are so infested with worms, that not more than one in ten is free from them; whilst, in some parts, the combination of certain condiments with the daily food appears to be so essential to the prevention of worms, as to have given rise to that ancient law in Holland, which enacted as a punishment, that criminals should be obliged to eat bread without salt, in order that their bodies might become infested with worms.

The second point of inquiry proposed with reference to the immediate cause of worms, namely, how far their developement in the body may depend upon a pre-existent favouring condition of constitution, affords one of the most difficult questions in helminthology. It appears, indeed, almost impossible to say, in any given case where worms are known to exist, and where their presence is accompanied by constitutional derangement, how far that state of constitution might have preceded the existence of parasites; or, on the other hand, to what extent it may have been caused by them. Common observation shows that the presence of worms is, in most cases, associated with a debilitated state of constitution, though they occasionally exist in the robust and healthy: but the amount of their dependency upon such a state of constitution, or, on the other hand, the share which they may have had in inducing it, is not easily determined.

The general law which has been attempted to be laid down, that parasites do not appear until the powers of the constitution are reduced to a certain standard, which is supposed to be favourable to their developement, is liable to so many obvious exceptions, as not, perhaps, to be of great value in physiology, at the same time it is that which every practitioner will bear in mind with advantage, since it is the one which will lead him to the most successful practice. For though, in many cases, no more may be required than the simple administration of medicines calculated to remove the parasites, yet the co-existence, frequently, of a state of debility or cachexia, appears so obviously favourable to their recurrence, as to leave no doubt of the necessity of combining constitutional with local treatment. Nor can the obvious connexion of worms with a certain state of constitution be overlooked in reference to the fact, that age appears to have a great influence over their developement, since in infants at the breast, and in adults, they are much more rare than in children in whom the tendency to their formation appears to be strong up to a certain age, generally the period of puberty, after which the habit of producing them appears spontaneously to cease.

Seat of worms. In reviewing the parasites of the human body and the various textures which they inhabit, it becomes difficult to fix upon any organ that may not afford a nidus for some one or more of them; for with the exception of the more solid parts, few appear exempt from their influence. Each organ or texture, however, seems to have its peculiar parasite, which is also in most instances limited to that organ. The following table will show the textures usually infested, and the species by which they are inhabited.

Small intestines	-	$\left\{ \begin{array}{l} \end{array} \right.$	*Ascaris lumbricoides.* *Tænia solium.* *Bothriocephalus latus,*
Large intestines	-		*Trichocephalus dispar.*
Rectum - -	-		*Ascaris vermicularis.*
Urinary bladder		$\left\{ \begin{array}{l} \end{array} \right.$	*Diplosoma crenata.* *Spiroptera hominis.* *Dactylius aculeatus.*

Gall bladder	-	-	*Distoma hepaticum.*
Kidney	-	-	-	*Strongylus gigas.*
Eye	-	-	-	*Filaria oculi.*
Liver	-	-	{ *Acephalocystis endogena.* *Echinococcus hominis.*
Spleen and omentum	-	*Echinococcus hominis.*
Ovary	-	-	-	*Polystoma pinguicola.*
Bronchial glands	-	*Filaria bronchialis.*
Muscle	-	-	-	{ *Trichina spiralis.* *Cysticercus cellulosæ.*
Brain	-	-	-	*Acephalocystis multifida.*
Cellular texture	-	*Filaria Medinensis.*

Symptoms. Under this head it is intended to mention only those symptoms which are caused by worms in general, as contra-distinguished from those which are peculiar to each species, and which will be subsequently noticed in conjunction with the description of those species.

For convenience of description, the symptoms caused by worms may be divided into the *local* and the *constitutional*, though it may be difficult to draw an exact line between these two.

The local symptoms vary according to the particular seat of the worms, the nature of the organ they inhabit, and the degree of impairment to its functions caused by the presence of the worms. The body may be infested by thousands of worms, and yet no symptoms whatever, either local or general, manifest themselves, so as to lead to any suspicion of their existence. This is the case with the *trichina spiralis*, whose seat in the muscular system. The *trichina* is generally found in such numbers as to defy all attempts at computation : yet their presence does not appear in the least degree to impair the functions of the texture through which they are scattered, nor was the presence of this worm in any of the cases on record even suspected during life. This circumstance may probably be explained by reference to the minute size of the entozoon, and also to the comparatively less importance of the muscular system in the animal economy.

Where the worms are larger, and the parts which they inhabit more immediately concerned in the vital functions, the local disturbance is proportionally greater. Thus the brain and the liver each exhibit symptoms of the disturbance to their function, when they become the seat of parasites. But it is more particularly in the case of worms inhabiting the intestinal canal that we may expect to find the evidences of their existence from symptoms especially referable to those parts. Pain in the abdomen like that of colic, and situated chiefly near the navel, is often complained of, though pain is by no means an invariable symptom of worms. Some indeed appear seldom to cause pain, as the tapeworm, which on account of the softness of its texture could hardly be expected to give rise to any very definite sensations, except such as might arise from its great length and bulk, interfering with the movements of the intestines. The *ascaris lumbricoides* more frequently causes pain, probably on account of its greater power of motion and firmer texture, and from the circumstance also of the body terminating in somewhat sharp extremities. The sensations, however of gnawing, piercing, or creeping, thus produced, are by no means constant, and not peculiar to worms, as they have frequently led to a suspicion of their existence where none certainly were present. The symptoms become more marked when the worms find their way to either extremities of the canal, as when the *ascaris lumbricoides* gets into the stomach and excites vomiting, or the *ascaris vermicularis* accumulates in or near the rectum, and gives rise to the intolerable itching which characterizes in a great measure the presence of that species. The irritation thus caused, however, is frequently propagated to a distance along the alimentary canal, so that not only is the rectum or anus

the seat of these distressing sensations, but the opposite extremity appears equally to sympathize; hence the frequent picking of the nose and lips, causing these parts to swell and often to bleed violently; the grinding of the teeth, especially in sleep, and similar marks of irritation.

The functions of the bowels are seldom properly performed. The evacuations are unnatural in quality and quantity, and there is generally either a costive or relaxed condition of body: these states frequently alternate with each other. The evacuations themselves sometimes consist almost entirely of mucus, which by some is considered to be produced by the irritation of the worms in the intestinal tract, and by others to be the very cause of their existence there. This mucus is generally more abundant at the times when the worms are passed, and the evacuations are then occasionally tinged with blood. More frequently, however, it may be said, that the stools present no unusual or characteristic appearance. Much, however, will depend upon the extent to which the digestive powers may have been impaired, for where the stomach is weak, the food is often passed in half-digested masses, or appears but little altered, and the evacuations become extremely offensive from the decomposition of the alimentary matters and the accumulation of unhealthy secretions. When this is the case, there is generally also considerable swelling of the belly, chiefly caused by accumulation of flatus in the bowels. The appetite is impaired, or more often voracious, so that a much larger quantity of food is taken than can be digested. The tongue is often white and loaded, the breath heavy or fetid, and there is often an increased flow of saliva, with a disposition to sickness, or actual vomiting.

The symptoms which indicate a disturbed state of the constitution, more remotely connected with the presence of worms in the alimentary canal, are so varied, that it is difficult to class them. The primary disorder of the digestive organs is often accompanied by a corresponding disturbance in other functions; and these remote influences are perhaps most frequently manifested in a disordered condition of the cerebral system, as manifested in the frequent occurrence of headache and giddiness, with ringing in the ears, disturbed sleep, with grinding of the teeth and sudden waking alarm; and the prevalence of somnolency, indolence, or ill-temper. The symptoms have, in some instances, run so high as to cause the case to be mistaken for one of hydrocephalus; but the pain in the head, dilated pupil, convulsions, and other signs imitating the true disease, have suddenly subsided on the removal of the exciting cause. These cases however must not be confounded with those in which hydrocephalus and worms are co-existent, constituting a combination of not unfrequent occurrence, especially in scrofulous children.

Chorea appears to be a not infrequent concomitant of worms in the intestines, though the degree of dependency of the disease upon their presence is not always easily ascertained: for it may be argued, that the subsidence of the disease on the removal of the worms might be more fairly attributed to the evacuation of the faulty secretions and the restoration of the parts to a more healthy condition. The spasmodic affection has sometimes assumed the more severe form of epilepsy, of which Bremser and others have related examples, though doubtless some of the cases related may have been more dependent upon the circumstances just noticed than upon the mere presence of worms. The cases in which, however, these morbid conditions are the most unequivocally connected with the existence of worms are those in which the symptoms have suddenly disappeared after their expulsion, and when various plans of treatment, short of effecting this, have failed, as in a striking case related by Dr. Suck, in which a young girl had been suffering from a violent spasmodic affection of the eyes, to which furious delirium and convulsions succeeded, and who was cured on the expulsion of a large number of worms, but not until after various purgative and vermifuge medicines had been used without effect. More rarely, trismus, tetanus, and hysteria, and various affections of the senses, as temporary deaf-

ness and amaurosis, have appeared capable of being traced to the existence of
intestinal worms ; and we have the authority of Hoffman for stating that aphonia
may be produced by a like cause, the voice being suddenly recovered upon the
expulsion of worms.   The same author considers worms as capable of inducing
temporary mental alienation.

A disordered condition of the circulation is also an occasional attendant on
the presence of worms in the intestines.   The pulse is often feeble, and the
general circulation languid, giving rise to coldness of the surface, especially of
the extremities, accompanied by palpitation of the heart.   In these cases the
countenance is pallid and sallow, the eyes sunken, and surrounded by a livid
circle.   Occasionally there appears a temporary excitement of the circulation,
constituting what has been denominated worm fever, which however is gene-
rally observed in scrofulous habits, and assumes the form of hectic, and hence
may be considered rather as a concomitant of that particular state of constitu-
tion, than as having any immediate connexion with the existence of worms.
When the digestive functions have been long impaired, the loss of balance
between lymphatic and lacteal absorption becomes strongly manifested in the
general atrophy which ensues.   The adipose and muscular tissues are gradually
wasted, and the dwindled limbs strongly contrast with the tumid and hard belly
so frequently met with in scrofulous children.

The intimate connexion of pulmonary affections with a disordered condition
of the alimentary canal, which so frequently comes under the notice of the prac-
titioner, receives a striking illustration in the case of worms.   Numerous cases
might be cited in which not only has the sympathetic connexion between gas-
tric or intestinal irritation and pulmonic disorder been manifested in the com-
paratively slighter forms of dry cough and dyspnœa as attendant upon worms,
but some more severe affections have been noticed, such as pulmonary hæmor-
rhage, of which examples have been given by Mr. Rumsey in his observations
on the coincidence of hæmoptysis with worms in the intestines.   (*Med. Chir.
Trans.* vol. ix.)

Morbid appearances caused by worms.   The worms which inhabit the intes-
tinal tract appear to be capable of inducing but very slight organic changes in
the textures with which they come immediately in contact.   For the most part
their presence there is accompanied only by a greater or less accumulation of
mucus, with some increased vascularity of adjacent textures ; but even these
appearances are often wanting.   The soft texture indeed of these parasites is
such as is not likely to produce any very marked changes in the adjacent tex-
tures by causing serious injury to these parts ; and even those worms which
may be found adherent by their suctorious mouths to the mucous membrane, as
the *tænia* and *bothriocephalus*, do not appear to excite much vascular action,
except perhaps in the immediate spot to which they are attached.   Both Brem-
ser and Rudolphi doubt whether the *ascaris lumbricoides* ever cause any amount
of irritation in the intestines.   They never observed them adherent to the
mucous membrane, but always loose, and generally enveloped in mucus, by
which they are as it were insulated from the surface of the bowels and thus pre-
vented from exciting inflammation.   One species, however, the *trichocephalus
dispar*, appears occasionally to do injury to the intestines, as in a case met
with by Mr. Joshua Brooks (noticed in the fourth volume of the museum cata-
logue of the Royal College of Surgeons), in which the worms were found in a
living state upon and in the cæcum, which was perforated, as it were, by a
number of pin holes.   A considerable portion of the internal coat was eroded.
(*Hunt., Mus. Gall.* prep. 173. A.)

The power of worms to penetrate into the abdominal cavity by perforating the
healthy coats of the intestine in the human subject has been asserted, but is
denied by Wickmann, Bianchi, Rudolphi, Bremser, and others, who consider
that all the cases on record of worms found in the peritoneal cavity after
death may be explained on the supposition that they had escaped by ulcerated

openings in the gut, or had been allowed to pass in by apertures caused by the sloughing of strangulated intestine. That worms do occasionally perforate the intestinal walls, so as to escape into the peritoneal cavity in certain animals, as fishes, birds, and some mammals, is beyond dispute. This is the case with the *ecchinorhynchus*, for instance, whose armed proboscis seems to render it fully capable of such performance; but it is difficult to understand how the *ascaris lumbricoides* with its simple suctorious mouth could penetrate the healthy intestines of man; nevertheless, the two following cases by M. Gaultier de Claubry may be quoted, as having been advanced in favour of such an idea. In a girl seven years old, who died of convulsions in six days, he found eleven of these worms in the general cavity of the belly, and the coats of the stomach perforated with holes, in some of which other worms were sticking. In another child of the same age, who died in seven days of convulsions, he found thirty-six worms in the peritoneal sac, a great mass of them in the stomach, and twenty-seven of them making their way through holes in its coats. (*Nouv. Journ. de Med.* ii. 266.) In these cases it is quite possible that the worms had escaped after death, in consequence of post mortem softening of the coats of the stomach.

In the following instance, however, it is probable that the worm escaped during life, though there is nothing to show that there had not pre-existed an ulcerated opening in the intestine by which the worm had escaped, the case therefore not differing from one of ordinary perforation of the gut and escape of its contents. A soldier in the Mauritius was seized with slight fever and severe pain, beginning at the pit of the stomach and gradually extending over the whole belly, which by the third day began to enlarge; bilious vomiting with costiveness and suppression of urine followed; the belly continued to increase, and the man died on the fourth day. On dissection several quarts of muddy fluid were found in the sac of the peritoneum, the viscera were agglutinated by lymph, a round worm was discovered among the intestines between the umbilicus and pubes, and the ileum exhibited a perforation six inches from the colon, corresponding in size with the worm. (*Med. Gaz.* vol. ii. p. 649.) In *Rust's Journal* the case of a woman also is mentioned, who after a tedious illness vomited several of these worms and was then seized with a painful swelling in the left side, which in course of time suppurated, and discharged along with purulent matter three other worms of the same kind. Here therefore it would appear that the worms had gradually made their way from the bowel to the surface of the body, by slowly exciting inflammation and suppuration with surrounding adhesion of parts, and so causing a cyst to be formed around the worms which subsequently opened externally.

This property of inducing so much irritation in the parts in contact with the entozoa as to cause the formation of a cyst around it, has been hardly ever observed in the case of worms inhabiting cavities which have external openings; but where the solid parenchyma of organs becomes the habitation of entozoa, then a cyst is generally formed, by which the worm is isolated from surrounding parts. This is the case when the liver, for example, becomes occupied by hydatids; a more or less dense albuminous or cartilaginous cyst is developed, in which the hydatids are contained, either singly or in great numbers. Even the minute *trichina spiralis* has been invariably found to be enveloped in a small cyst, in which the worm lies coiled up, and the walls of which are generally strengthened by a greater or less deposit of earthy materials in its interstitial texture.

General treatment. Under this head it will be convenient to point out the general principles which should constitute a guide in the management of cases of worms, and also to mention the principal medicines which have obtained reputation for their vermifuge properties, referring, however, to the description of the different species for particular plans of treatment appropriate to each. Some of the entozoa are necessarily not answerable to medical treatment, on

account of their position, even could their existence be certainly ascertained ; others occasionally require manual interference for their removal ; while those only which occupy the alimentary canal may be considered as within the influence of remedial agents.

The indications to be fulfilled in the treatment of worms are of two distinct kinds, the one having reference simply to the expulsion of the parasites, and the other to the correcting of that state of constitution which appears most favourable to their developement.   Hence vermifuge medicines have been divided into the *evacuant* and the *corroborant*, according as they have been supposed capable of effecting one or other of these ends, and both these are included under the general head of *Anthelmintics*.

The *evacuant anthelmintics*, or those which accomplish the expulsion of the worms, may be again subdivided into such as are simply *purgative*, and such as dislodge or destroy the worms by their *mechanical* action upon them.

Of these, the *purgative evacuants* are those in most frequent use.   The object of their exhibition is to remove, not only the worms themselves, but also the superabundant mucus in which they are often lodged, at the same time that they assist in restoring the healthy secretion.

The purgatives may be either of the saline, oily, or drastic class, but in the employment of these some discrimination and caution must be used.   Drastic purgatives are perhaps too commonly employed in the treatment of worms without due regard being had to the powers of constitution, and particular condition of the patient.   Their frequent exhibition, if too long continued, is often attended by a degree of debility, which in itself will constitute one of the conditions apparently most favourable to the production of worms ; and in all cases where there is much gastric or intestinal irritation, the drastic class of purgatives should be carefully avoided.

Those in most frequent use are scammony, gamboge, aloes, colocynth, and calomel, which may be given singly or in combination.   Their exhibition, also, in a large dose and at intervals, is more likely to accomplish the object intended, than when smaller quantities are more frequently exhibited ; and in some children, especially those of strong constitution, it is necessary to follow up this plan with great perseverance.   The combinations with calomel are exceedingly useful by preventing the secretion of bile, and thus assisting in clearing away the superabundant mucus which lodges in the intestines.   The saline purgatives are not usually much employed, but of these the sulphate of potash and common salt or sea water are considered the most efficacious.   The oily purgatives, on the other hand, are deservedly in great repute—castor oil, croton oil, and even the olive and other bland oils in large quantity, but especially oil of turpentine, which, for the expulsion of *teniæ*, constitutes one of our best anthelmintics, acting both as a poison to the worm, and also as an evacuant.

The *mechanical evacuants* have by some authors been much lauded, but their powers appear to have been overrated, and some have been proposed which certainly could not be exhibited with safety.   Of mechanical evacuants, the two which have acquired the greatest reputation are cowhage and pulverized tin, zinc, or iron.   Cowhage, or the hairs of the pod of *mucuna pruriens*, has long been reputed as a vermifuge, and though not much used in this country, appears to be still often administered in the West Indies.   The pods are dipped in syrup to entangle the hairs upon their surface, which are then scraped off, and formed into an electuary, of which a tea-spoonful or more is given daily for three successive days, followed by a brisk purgative.   This remedy appears most useful in expelling the thread-worms, upon which it is considered to act mechanically, the sharp spines entering their delicate skins, and causing them to quit their position, their expulsion being afterwards effected by cathartics.

As a mechanical means, the powder of tin appears to act in a similar way. This is a more ancient remedy ; at least it is mentioned by Paracelsus, though it does not appear to have been much used until it came to be generally intro-

duced about a century ago by Dr. Alston, who prescribed it in doses of from half an ounce to an ounce mixed with treacle, followed by a purgative, which generally brought away the worms. These large doses, however, appear to have been abandoned, not more than from a scruple to a drachm being given for a dose three or four times a day, and followed by a purgative ; neither this, however, nor the former remedy, are now much employed in this country Several other substances, which have obtained more or less repute, appear to act by irritating or destroying the worms. Turpentine has been already mentioned, which acts both as a purgative and also by poisoning the worms, as appears from their being expelled dead in almost every instance when this has been given. Dippel's animal oil and Chabert's oil appear to act in the same way, as probably do also the following—oil of juniper, essence of bergamot, camphor, tobacco, sulphuretted hydrogen and sulphuret of tin, valerian, assafœtida, garlic, bark of Geoffroya inermis, bark of pomegranate root, and root of male shield fern, together with certain bitters, as wormwood, tansy, chamomile, &c.

It would not be difficult to extend the list of *specifics*, which have been proposed for worms, almost *ad infinitum ;* and it may be doubted how far some of those just enumerated act as a direct poison to them, while it may be contended that the bitters act also as tonics by restoring the tone of the digestive organs, and thus might, with more propriety, be arranged under the second class of remedies, namely,

Corroborant anthelmintics. It has been stated, that while the first object in the treatment of worms is to effect their expulsion by the exhibition of such remedies as either act destructively upon them, or expel them living, the second and almost equally important end is to prevent their recurrence by restoring the powers of the constitution when they may have been, as they often are, impaired. For this purpose chalybeates have been preferred to any other form of tonics ; and their exhibition must be guided, not so much by reference to any precise mode of practice, as upon the general rules which would direct the practitioner in the exhibition of tonic medicines. When the stomach will bear it, we have found the carbonate of iron given in drachm doses mixed with treacle, twice or thrice daily, one of the most useful forms. In other cases, especially in females and delicate children, the milder preparations often prove more advantageous, as the potassio-tartrate of iron in half drachm doses in solution, or the wine of iron. The Mistura Ferri and the sulphate of iron are preferred by many practitioners ; the former especially appears to restore red blood rapidly, and is a very efficient remedy. But when all these have failed, and it is often necessary to try each in succession, we have found great advantage from the exhibition of the Liq. Ferri Superacetat. (prepared by Messrs. Drew and Heyward) in doses of five to ten minims, three times a day. The Tinct. Ferri Sesquichloridi will be occasionally found a useful form, particularly in females ; or the natural chalybeate waters may be used, according to circumstances.

In those constitutions which will not bear the exhibition of steel, and especially in scrofulous children, the combination of powdered bark with carbonate of soda, in doses of five grains each, given twice or thrice daily, will often prove extremely serviceable.

The necessity of a strict attention to diet, and the exclusion of all unwholesome and indigestible articles of food, where this is possible, need hardly be insisted on ; but among the children of the poor, in whom it will perhaps be generally admitted that worms are the most frequently found, the practitioner will of necessity encounter great difficulties upon this point.

CLASSIFICATION OF WORMS.

No natural arrangement of the animal kingdom could ever comprehend such a class as the *entozoa* (εντος, *intus* ; ζωον, *animal*) ; for the animals which have been thus indiscriminately grouped together, possess but one character in common, which is derived from the circumstance of their inhabiting the bodies of other animals. Beyond this single part of similarity in habits and localization, they have no claim to be considered as a natural group ; for they differ widely from each other both in organization and in form : while on the other hand, many of the species so closely resemble others that are not of parasitic habits, but are found in totally different situations, as clearly to show, that the setting apart of a group of animals merely from the circumstance of similarity in their pre-dacious habits, while it constitutes an unnatural union of widely differing forms, must, at the same time, necessarily dissociate others which have the closest congeneric affinities.

This view of the subject is the necessary consequence of a more perfect knowledge of the organization of the entozoa ; and while for the sake of convenience we still class them together as a peculiar group of animals, we may at the same time with advantage subdivide them, in reference to their more natural affinities.

The following tabular arrangement presents such a subdivision. The ento-zoa of man are there arranged, according to their structural affinities, in three classes, which would again admit of further separation into orders. But since we have only to speak of the few entozoa which inhabit the body of man, no further division seems necessary. The locus, or peculiar habitat of each species, is subjoined to the generic and specific names.

I. ENTOZOA HOMINIS.*

Classis PSYCHODIARIA (Bory St. Vincent).

Genus	1. Acephalocystis endogena	-	-	Liver, abdominal cavity.
	2. Acephalocystis multifida	-	-	Brain.
	3. Echinococcus hominis	-	-	Liver, spleen, omentum.

Classis STERELMINTHA (Owen).

4. Cysticercus cellulosæ	-	-	Muscle, brain, eye.
5. Animalcula echinococci	-	-	Liver, in the echinococcus.
6. Diplosoma crenata	-	-	Urinary bladder,
7. Tænia solium	-	-	Small intestines.
8. Bothriocephalus latus	-	-	Small intestines.
9. Distoma hepaticum	-	-	Gall-bladder.
10. Polystoma pinguicola	-	-	Ovary.

Classis CŒLELMINTHA (Owen).

11. Trichina spiralis	-	-	Muscle.
12. Filaria Medinensis	-	-	Cellular tissue.
13. Filaria oculi	-	-	Eye.
14. Filaria bronchialis	-	-	Bronchial gland.
15. Trichocephalus dispar	-	-	Cæcum, large intestine.

* This classification is a slight modification of that of Mr. Owen, in the Cyclopædia of Anatomy and Physiology. vol. ii. p. 126, art. ENTOZOA.

Class Psychodiaria.

This class includes the simplest forms of parasites with which we are acquainted ; so little indeed do they possess of the character of true animals, that some physiologists have been led to question the propriety of placing them at all in the animal kingdom. Those which here require notice are well known under the familiar name of *hydatids*, of which they constitute the simplest kind. They consist of a globular bag in which is contained a transparent fluid ; the parietes being formed by successive layers of opaque condensed albuminous matter. A power of growth by imbibition, and of reproduction, by the developement of buds from either the outer or inner surface of this animal bag, constitutes the only features which appear to give these products any title to be ranked in the same kingdom with the parasites of a higher grade, circumstances however in which they very nearly approximate to some of the lowest classes of vegetables.

1. *Acephalocystis* (*a*, κεφαλη, *caput;* κυστις, *vesica*) *endogena*. This was denominated by Hunter the pill-box hydatid, from the circumstance that the young are developed between the layers of the parent cyst, and gradually protrude like buds from the inner surface, until they become detached and float about in its cavity, where they grow by the simple process of imbibition, and in turn produce other cysts from their interior. The term *endogena*, as expressive of this fact, is used to distinguish this species from the *acephalocystis exogena* of ruminant animals, which develope the young vesicles from its exterior surface. This form of hydatid presents no other kind of organization or structure than that just described. It appears to be nourished by the imbibition of fluids, and the fluids, and the transmission of them into the interior through the membraneous parietes.

This species of *acephalocyst* is by no means unfrequently met with in the human liver, where it will sometimes accumulate in immense quantities. It does not appear to injure the structure of that organ, for it is invariably found enveloped in an adventitious cyst, which forms no part of the animal itself, but appears to be thrown around by the action of the vessels of the liver, with the object of isolating the parasite, and so preventing its interference with the functions of the organ, which, however, generally become deranged when the hydatids are very numerous. From the particular mode in which these animals multiply, it will be easily understood how a single cyst in the liver may contain a very large number of them; for as the parent cyst grows, successive cysts are perpetually forming in its interior, and these again giving rise to successive generations, until the primary cyst at length comes to contain many thousands of them. When the cyst in the liver becomes thus enlarged, it generally forms a prominent tumour, which points in the hypochondrium. And these cases have been occasionally tapped, where, on account of the great accumulation of fluid, the sensation of fluctuation was very distinct in the part ; and by this means the cyst has been emptied of its contents, the smaller hydatids flowing through the canula, and the larger ones coming away in shreds.

The diagnosis of these cases cannot be made with any certainty, and the treatment of them does not differ from that usually adopted when the functions of the liver are otherwise deranged. When the fluctuation is very distinct, and other circumstances are favourable, tapping affords a fair prospect of relief. For this purpose a large canula should be used, that it may not be

blocked up by the hydatids sticking in the tube, and thus retarding the evacuation of the cyst. It is surprising how large a cyst may be permanently emptied in this way. A woman between forty and fifty years of age was for more than two years a patient in St. Bartholomew's Hospital. During the earlier part of this time she was tapped repeatedly, and as much as from two to three gallons of fluid mixed with hydatids were drawn off at a time. This woman died of another disease, and on post mortem examination the structure of the liver was found perfectly natural, and the remains of the empty cyst which had contained the hydatids reduced to the size of a walnut : no other cyst could be found in the liver.

2. *Acephalocystis multifida.* This we have ventured to name as a new species, conceiving it to differ from the foregoing in some important particulars. We are not aware that it has ever been met with or described previously. The preparation from which this description is taken is in the pathological collection of Dr. Farre, and was brought over to this country from Barbadoes, by the late Dr. Jones, who, it is to be regretted, has left no record of the case. The subject of it however is known to have been a coloured man named Belgrave, who by his own exertions had amassed considerable property in Barbadoes, and who had been subject to fits. The preparation consists of that portion of the brain in which the hydatids were found. They are seen occupying an irregular cavity about an inch and a half in breadth and nearly three in length, which is situated in one hemisphere of the brain, and extends into the lateral ventricle of the same side. Each hydatid occupies a separate cyst, the walls of which are formed of a thin and delicate membrane ; but as all the cysts are in close apposition, a coarse kind of cellular tissue is the result, within which the hydatids are contained. Several of the hydatids are perfectly globular and vary in diameter from a quarter to half an inch. Others present an appearance of small buds or projections from the outer surface, which are contained in corresponding pits or depressions in the enveloping cyst, while others again have a true multifid character, consisting of several hydatids of an irregular pyriform shape, connected together by their elongated necks. Each of these however occupies a separate cell, the necks piercing the walls of the individual cells, and communicating with a common cyst, which may be supposed to have been the parent one. One of these groups of hydatids consisted of six united together. No structure whatever beyond that of a mere membrane could be discovered. There was no distinct head nor armature of any kind, but where the necks were joined the membranous parietes were continuous, thus constituting as it were a compound or ramified bag.

It would appear as if all the hydatids had been at first simply globular, but by a process of generation from the outer surface the little buds already metioned arose, and forming corresponding pits or depressions in the walls of the containing cell, thus assumed a compound form; the little buds growing into larger vesicles, and the pits enlarging into separate cells to contain them.

3. *Echinococcus* (εχινος *echinus ;* κοκκος *bacca*) *hominis.* This parasite, which closely resembles the preceding genus, is found in cysts in the liver, spleen, omentum, and mesentery. It consists like the former of a simple bag, which appears to be formed of two layers—an outer coriaceous one, and an inner transparent gelatinous tunic. To this inner coat are appended the singular bodies, termed the animalcules of the echinococcus, presently to be noticed, for which this genus is remarkable ; and except in this particular it does not appear to differ from the simple acephalocyst.

Class STERELMINTHA.

The class of solid or parenchymatous entozoa, *Sterelmintha* (ελμινς, *lumbricus ;* στερεος, *solidus*), though more perfectly organized than the preceding, present

nevertheless great simplicity of structure. They consist for the most part of a solid parenchymatous texture, in which are excavated, as it were, the canals or cavities which serve the purpose of digestion. They have no separate tegumentary system. They have but one opening to the alimentary canal, and the sexes are placed upon the same individual.

4. *Cysticercus* (κυστις, *vesica;* κερκος, *cauda*) *cellulosa*. This parasite is not common in man, though very frequently met with in animals, especially in the hog, when it produces the state of muscles called measly pork. It occurs in the muscular system, but has also been found in the eye. The animal is always enveloped in an adventitious cyst formed apparently out of the interfascicular cellular tissue of the muscles condensed by adhesive inflammation. It differs in structure from the acephalocyst in the circumstance of its possessing an elongated neck terminating in a distinct and somewhat globular head. This head is armed by a small crown or double row of recurved spines, for the purpose of enabling the entozoon to pierce and fix itself to the soft parts in which it is found ; while around this are placed four suctorious discs or true mouths, through which the nutriment is imbibed and carried into the dilated bag which constitutes the body of the animal. It is in the circumstance of these distinct traces of organization about the head, that the *cysticercus* differs mainly from the *acephalocyst*, though both are confounded together under the common term of hydatid.

But few of our museums contain specimens of this entozoon ; hence it must be considered as rare, though it appears to be more frequently met with on the continent. Rudolphi states that four or five examples occurred annually at the anatomical school at Berlin for several years. They have been most frequently met with in the glutæi, psoas, and iliacus internus muscle, and in the extensors of the thigh.

Soemmering met with one instance in which it appeared in the anterior chamber of the eye, and a similar case is related by Mr. Logan, as having occurred at the Glasgow Ophthalmic Infirmary. In the latter case, the child who was the subject of it had suffered for a considerable period with ophthalmia, after recovery from which the hydatid was observed. Its movements could be easily seen through the cornea, and as it continued to grow, inflammation was again set up. It was thought desirable to attempt the removal of the hydatid by incision through the cornea : in the attempt the hydatid was ruptured, and the remains of it extracted by the forceps. It was so delicate as scarcely to bear the slightest touch.

5. *Animalculi echinococci*. These animalcules are chiefly remarkable for the position in which they are found, being apparently the parasites of a parasite. They are found floating loosely in the cavity of the *echinococcus ;* at least when the cyst is broken they float freely out, though from the nature of the armature about the head, it may be inferred that they have the power of attaching themselves to the walls of the cyst in which they are enveloped.

In a case related by Müller in which a cyst of this kind was passed with the urine, the animalcules which floated in the contained fluid of the cyst were found to present a circlet of hooks and four processes around the head. The posterior end of the body was obtuse. Some of the animalcules were enclosed in secondary cysts floating in the primary one ; while others presented a sort of pedicle at their obtuse extremity, which had probably been a medium of attachment, and appeared to have been broken. Upon examining the body of a patient who died lately in the London Hospital, a large cavity was found in the liver, in which were contained from thirty to forty of these *echinococci*. Some of these were as small as a mustard-seed ; the largest about the size of a musket-ball. All however contained the animalcules, some with and some without cysts. The animalcules measured about the $\frac{1}{80}$th of an inch in length, and had the usual armature of spines about the head. It would appear therefore that the presence or absence of these animalcules constitues the distinguishing feature between

echinococcus and *acephalocystis*, a distinction, which for the purpose of classification it may be well, in the absence of more extended observation upon the relative connexions of the enveloping cyst and its singular contents, to retain: for pathological purposes however the distinction is an unnecessary one.

6. *Diplosoma* (διπλοος, *duplus*; σωμα, *corpus*) *crenata*. This parasite has been confounded with *spiroptera hominis*, to which however it does not bear the slightest resemblance; but the confusion has arisen from the circumstance of both having been passed from the urinary bladder of the same individual, whose case also constitutes the only example on record of either of these parasites occurring in man. The particulars of this case are recorded by Mr. Lawrence, in the *Medico-Chirurgical Transactions*, vol. ii. The female who is still living in St. Sepulchre's workhouse, has been subject for a period of thirty-five years to retention of urine, accompanied by various distressing sensations referred to the bladder and kidneys, and requiring daily use of the catheter. The passing of these worms dates from an early period in the history of the case, and appears to have commenced shortly after the introduction of a sound into the bladder, with a view to ascertain whether the symptoms were due to stone. It appears probable that the worms had been contained in a cyst in the bladder, which was ruptured by the instrument; as shortly after this event, they began to pass by the catheter, and the operation itself was attended by sensations on the part of the woman, which appeared to arise from the rupture of a cyst, and the liberation of worms into the bladder.

The worms thus passed were of two kinds; one of which will be here described, and which though long known, yet from the uncertainty which appears to attach to the precise nature of its organization, and the doubts which some physiologists have cast upon its title to be ranked at all as an organized being, has not yet been described under any definite name. This deficiency therefore has now been supplied, from a firm conviction derived from the examination of numerous specimens, that the worm is a true entozoon, and therefore deserving to be so entitled.

This worm varies in length from four to six or eight inches, and is thinnest at the middle part, where it is bent at an acute angle upon itself, so that the two halves hang nearly parallel, and give to the entozoon an appearance as if two worms had been tied together by their heads.

At the point opposite the angle there is always found a rough surface, as if at this part there was a point of attachment which had been broken. From this central point the body gradually swells out towards the extremities, but contracts again within half an inch of the end, and terminates at one extremity in a tolerably sharp point, and at the other in a ragged end. The worm is solid throughout, consisting of a firm homogeneous texture of a white or yellow-white colour. The upper surface is convex; the under is formed usually of two planes meeting at an obtuse angle, and leaving a longitudinal groove between them, in which is often found lodged a dark corneous concretion. Along the line of junction of the upper and under surfaces, there runs on the outer side a delicate membranous border, the edge of which is beautifully crenate, and upon examination with the microscope the crenatures themselves are seen to be also crenate. The worm is solid throughout, and has no trace of any internal organization, except that of a delicate white line like a nerve running through the centre of the body, and giving off a few small branches. There are no signs of a mouth, but from the circumstances of the central bent portion of the body having a rough surface, it may be presumed that the worms are not voided entire, and indeed it is probable that nothing but the opportunity of instituting a post mortem examination of the case will serve to clear up the nature of this singular product. The notion of Rudolphi, to whom specimens were transmitted for examination, that they are simply portions of lymph cast in this peculiar form in the internal parts, is not reconcilable with the circumstance of their being very unequal in size, and not by any means uniform in shape, and having

also the beautifully perfect crenate margin already described. We have been repeatedly also assured by the woman herself, that when first voided the worms may be seen to move, and that they are found to make their way to a distance in the bed. But very few specimens have been passed lately, and these only when the bladder has been previously injected, for which purpose warm water is occasionally used. The other form of worm passed will be described under the title of *Spiroptera*.

7. *Tænia solium*. The common tape-worm of this country is generally from five to ten feet in length, and in breadth from the fourth part of a line at its anterior part to three or four lines towards the posterior part, where it again diminishes. It is composed of numerous segments, which towards the head appear to be very slightly indicated, but are more marked lower down, where they become subquadrate, and at length elongated, so that the length of each segment exceeds the breadth.

The head is small and somewhat flattened. In the centre of it is a projecting papilla armed with a double circle of hooks, and around this are four apertures of suckers, placed at equal distances, which constitute the true mouths by which nourishment appears to be imbibed. Each of the joints is also furnished with a pore situated in the centre of a small prominent papilla ; the pores occurring on either side alternately. These were formerly supposd to furnish each joint of the animal with a means of obtaining nutriment independently of the head, but are now generally believed to be connected solely with the generative system. From the mouth proceeds a canal or vessel on either side : these run parallel and near the margin of each segment, from one extremity of the animal to the other, being connected by numerous transverse vessels, of which there is one at the top and bottom of each segment. These canals may be easily injected by a pipe placed in one joint, the injection running readily into several contiguous joints. It is supposed that some amount of nourishment may also be effected by cutaneous absorption.

The generative apparatus in the tænia consists of a ramified canal or ovarium occupying the greater part of the centre of each joint, and containing the ova. From this a duct is extended to each lateral pore, to allow of the escape of the ova, and these latter are supposed to be impregnated, in their passage outward, by the secretions from a small vesicle furnished with a duct, which terminates at the same point as the oviduct. These worms are very rarely passed entire : single joints often come away, especially in children ; or portions of two or three feet in length are voided, but it is very rarely that the portion on which the head is situated is thus passed. There appears to be no limit to the length to which the worm may grow. If we are to credit the older writers, many hundred feet have been attained, but there appears to be no reason to doubt that worms measuring sixty feet are of occasional occurrence. As many as eighteen or twenty worms have been passed in the course of a few days, but frequently they occur singly.

The *symptoms* caused by tænia are in many instances not exhibited in a striking degree ; indeed, it not unfrequently happens that the passing of a portion of a tape-worm is, to the patient, the first indication of its presence. More frequently, however, the functions of the stomach and bowels are impaired. There is either a loss of appetite or a continual craving for food ; pains in the stomach and bowels are often complained of, and certain uncomfortable sensations are referred to the supposed movements of the worm ; but, probably with the exception of those cases when the worm accumulates in tangled masses and so causes obstruction of the bowels, their presence cannot give rise to any distinct sensations on the part of the patient. They cause, however, itching about the nose and anus ; and the bowels are either relaxed, or more often in a state of constipation. The constitution, is generally more or less affected. Giddiness, headache, stupor, dulness of vision, weariness and pains in the limbs, accompanied by pallor of countenance and emaciation, and indeed a general

torpor of the system not unfrequently accompany the presence of this parasite; especially in the ill-fed, who appear to be more than others liable to become infested with this worm. The habit of passing portions of tape-worm will continue with some individuals for a period of several years. In others all the symptoms subside rapidly, and the body is restored to a perfect state of health shortly after the complete expulsion of the parasite. It is by no means uncommon to observe a number of separate joints expelled at a time, especially in children; a circumstance which has led to the mistake of supposing that each joint was a separate worm of some very different genus.

Treatment. The remedies which have been found most efficacious in the treatment of tape-worm, are oil of turpentine and some empyreumatic oils; the root of the pomegranate and of the male shield fern; zinc filings, and drastic purgatives. Many other anthelmintics have been proposed for the expulsion of this worm, but are either very inferior to these, or totally inefficacious. And of those just enumerated, the oil of turpentine appears to have obtained so decided a superiority in the practice of the present day, as to have almost entirely superseded the use of other remedies.

The use of the oil of turpentine appears to have been first noticed by Mr. Malden in the Memoirs of the London Medical Society for 1792; and though, since that time, it had been used by Dr. Sims, and also recommended in the work of Rudolphi, it does not appear to have been generally known to the profession until the publication of a letter to Dr. Baillie by Dr. Fenwick in the *Medico-Chirurgical Transactions*, vol. ii., in which the author speaks of oil of turpentine as a new remedy, and relates several cases in which it had been exhibited with success. The quantity given in these cases was two ounces, which, if no evacuations were procured, was followed by another dose of one ounce, and this succeeded generally in bringing away the worm dead, in from half an hour to an hour afterwards. " From the general failure," he observes, " of purgative medicines in this disease, and from the worms being dead when they are passed, we may conclude that, besides its purgative quality, the oleum terebinthini is really poisonous to the tænia; but although destructive to the worms present, it does not appear to remove the tendency to generate others. And in reference to the largeness of the dose recommended, he remarks, that " its quick action on the bowels prevents its absorption, and, accordingly, we find in these cases no complaint of those affections of the urinary passages which have arisen from much smaller doses." With regard to the mode of exhibition, he recommends " to take either no supper, or a very light one the night before; to abstain from all food or liquid till the medicine has operated twice or thrice, or a worm has passed, and then to dilute freely through the day."

The oil of turpentine is not now usually given in such large doses as here recommended. The dose for an infant, says Dr. Mason Good, is from half a drachm to a tea-spoonful given in milk; a child of ten or eleven years old may take an ounce without any evil effects in ordinary cases: but in delicate habits a full dose sits uneasy on the stomach, and disquiets the system generally, though in different ways: for it sometimes produces a general chill and paleness, sometimes a tendency to sleep, and sometimes an alarming intoxication. It is in small doses alone, as half a drachm or a drachm to an adult, that it enters into the circulation, and proves an acrid irritant to the bladder, often exciting bloody urine.

The remote effects upon the urinary organs may in most cases be avoided, by taking care to give the turpentine in sufficiently large doses to insure its purgative action, and thus to prevent its retention in the bowels for so long a time as to favour its absorption; or, if it do not thus act, to combine it or follow it up with a dose of castor oil, the combination of half an ounce of oil of turpentine with an equal quantity of castor oil, or double the quantity of olive oil, will be generally found to accomplish the intended object with little, if any of

the unpleasant effects attaching to the use of this remedy. The sense of giddi-
ness and intoxication, however, appear in most cases to be the unavoidable
accompaniments of this medicine: they are generally only of short duration,
but will sometimes continue for several days afterwards, accompanied by head-
ache, and must in that case be combated by gentle purgatives as long as the
unpleasant sensation continues, and any smell of turpentine remains in the
urine. To avoid the occurrence of gastric or intestinal, or urinary irritation
during the use of the remedy, it is desirable to take freely of broths and muci-
laginous decoctions; and, to avoid sickness, the patient should remain at rest;
and take the medicine two or three hours after a full meal rather than upon an
empty stomach. It is frequently necessary to repeat the medicine two or three
times, with intervals of a day or two, and, when half an ounce is not sufficient,
to increase the quantity to an ounce or even two ounces where the constitution
is strong; but this larger dose is not often required, and should not be exceeded.
The turpentine, when given alone or combined with castor oil, is most conve-
niently exhibited in milk, or in some of the aromatic waters. The various forms
which have been proposed for making it into an emulsion are objectionable,
both on account of their proving more offensive to the stomach than the plain
oil, and, also, from the minute subdivision favouring absorption into the circula-
tion, and diminishing the purgative power of the medicine.

Chabert's empyreumatic oil, though not much known in this country, appears
to have attained a high reputation on the Continent as a vermifuge in the treat-
ment of tænia. Rudolphi considers it as the very best of all vermifuges, and
Bremser attaches a very high value to it. The observations of Chabert on its
efficacy in expelling worms from oxen, sheep, and dogs, appears to have led to
its exhibition in man. The oil is prepared by mixing together one part of
empyreumatic oil of hartshorn with three of oil of turpentine, and, after allow-
ing them to stand three days, distilling off three-fourths of the mixture by the
aid of a sand bath. It appears to be very similar in its effects to the oil of tur-
pentine, but is even more unpleasant to the taste, especially after being exposed
to the air, when it becomes blackened, and is rendered thicker and more nau-
seous. According to the experience of Bremser, who has used Chabert's oil in
many hundred cases, it not only has the advantage of destroying the worms,
but also appears to exterminate their ova, and thus effects a permanent cure;
as the proportion of cases in which the parasite was found to return was not
more than one *per cent.* of the number treated. He has given it to children of
a year and a half old with impunity. He begins his plan of treatment by the
exhibition of a purgative electuary, and then gives two tea-spoonsful of the oil
in a little water, night and morning, and when, in the course of a few days,
about three ounces have been taken, a purgave is interposed, and the oil resumed
until from four to six ounces altogether have been consumed. He recommends
during the time a moderate diet, and cautious use of farinaceous food and fatty
substances. The worm is not generally expelled, immediately and entire, as
after the use of turpentine, but appears to remain and become partially digested
and disorganized, and hence the efficacy of the treatment is to be gathered,
rather from the cessation of the symptoms, than from the obvious expulsion of
the worm, which, in many cases, could not be detected. This remedy is liable
to the same objections as the oil of turpentine, and is apt to produce the same
symptoms of irritation both in the digestive and urinary organs, and also in
the cerebral system. These it is recommended to obviate by the same means
and precautions as are to be followed in the use of turpentine; and some authors
considers it safer to begin with a smaller dose than that recommended by
Chabert; as half a tea-spoonful, gradually increased. The nauseous flavour
may be in some measure covered by the addition of syrup of lemon, or by for-
cibly rinsing the mouth afterwards with water, and then chewing a clove or
piece of cinnamon; or the oil may be made into small boluses, and swallowed
enveloped in thin wafer paper.

Dippel's animal oil, given in doses of a few drops in water or emulsion, and repeated two or three times daily, has proved efficacious in the treatment of some obstinate cases, but appears now to have fallen into disuse.

The bark of the pomegranate root (*punica granatum*) has somewhat recently obtained reputation as a means of expelling tænia, though it is spoken of as a vermifuge by Celsus. The attention of the profession appears to have been called to it by a paper by Mr. Breton published in the *Medico-Chirurgical Transactions*, vol. xi. p. 301, and entitled, " On the efficacy of the Bark of the Pomegranate Tree in cases of Tænia." The author states that, " having observed in Dr. Fleming's catalogue of Indian medical plants and drugs, that the decoction of the bark of the pomegranate root is ranked as an efficacious remedy for the removal of tape-worm, he had afterwards an opportunity of putting its effects to the fairest test of experiment, and relates eight cases in which the remedy had been effectual in getting rid of the worms.

The bark was used by him both in the form of decoction and powder. The decoction was, in the first instance, made by boiling two ounces of the recent bark of the root in a pint and a half of water, and reducing this to three-quarters of a pint. About two ounces of the cold decoction were given, and repeated four times at intervals of half an hour. About an hour after the last dose, an entire tænia was voided alive, measuring eight feet in length. A decoction, made with a similar quantity of the dried bark, was found to be rather too strong, producing giddiness, sickness, and uneasy sensations in the bowels, but equally expelling the worms. The dried bark in the form of powder, in doses of one or two scruples, mixed with an ounce of cold water, was given in other cases with similar results, and this form of exhibition appeared preferable on account of the greater mildness of its action. With a view to ascertain the nature of the action of this substance upon the tænia, some living specimens were placed both in the decoction, and also in the water with which the powder was mixed. The instant they were plunged in these preparations, they writhed and otherwise manifested great pain, and died in the space of five minutes. In plain water these worms will live several hours after expulsion. The use of the pomegranate root, both in this country and in France, appears to have borne out the favourable character which it had previously acquired in India, and both Cloquet and Martinet speak of it as being the remedy which in France is chiefly trusted to for the expulsion of tænia. It is recommended that the medicine should be exhibited to the patient fasting, and should be followed by a purgative, as a full dose of castor oil.

The root of the male shield fern (*aspidium filix mas*) spoken of as a vermifuge by Pliny and Galen, has acquired some notoriety in modern times. It constituted the basis of Madame Nouffer's treatment, whose secret was purchased in the last century by the French government at a large sum. In preparing the root, or underground stem, the outer part is to be removed, and also both extremities, that is, the upper greener part, and the lowest or oldest portion. The root is then to be pounded, and from two to four drachms of this taken in water. It is, however, a nauseous medicine, and requires to be long persevered in, and given sufficiently often to keep the bowels constantly full of it. Hence it is very apt to disorder the stomach. M. Peschier has recommended as a substitute the *oil* of fern root, prepared by treating the root with æther. Thirty drops of this oil are equal to three drachms, or a full dose of the powder, and this quantity is recommended to be given in two portions, either in pills, or in the form of an emulsion. In those cases where it succeeded, the worm was expelled lifeless. The success of this remedy appears to be chiefly exhibited against the bothriocephalus latus, but in the treatment of the tænia of this country, its efficacy appears very doubtful. The efficacy of the oil shows that the action of the fern root upon the worm is not, as has been supposed, merely mechanical.

Drastic purgatives appear to be of less value in the treatment of tænia than

in that of other worms. The exhibition of purgatives has been shown to be in most instances a necessary accompaniment to other remedies; but, given alone, they will very seldom succeed in effecting the expulsion of tape-worms, and should not therefore be given until other remedies have failed.

Lastly may be mentioned zinc, either granulated or in filings. The action of this remedy appears to be purely mechanical. Hence, as might be supposed, the filings, from being sharper, have been found more efficacious in expelling the worms than the grains. Alston recommends an ounce of the filings to be taken in four ounces of treacle, a purge being first exhibited; half the quantity to be repeated on the two following days, and lastly a purge to remove all. The granulated zinc is less apt to irritate the bowels than the filings. Tin has been used for the same purpose as zinc.

8. *Bothriocephalus* (βοθριον, *scrobs*; κεφαλη, *caput*) *latus*. This was formerly called *tænia lata*, but is now placed in a separate genus on account of the following distinctive character. The segments of the body are broader than they are long, a circumstance which has given to the worm its trivial or specific name *latus*. The head is of a different form from that of tænia. It is small and elongated, and instead of the four round oscula characteristic of tænia, it has a longitudinal fossa or bothria on each side, which divides the head into two lobes; a minute pore, situated in the centre between these, is considered to be the mouth. In some species, however, there are certainly two pores or mouths, situated one at the extremity of each lobe of the head. The head is not armed with spines like that of tænia. The generative pores, instead of occurring alternately at the margins of the segment, are placed in a single row, one occupying the centre of each segment, a circumstance which gave rise to the two species being characterized as " tænia osculis marginalibus," and " tænia osculis superficialibus." In other respects, bothriocephalus does not differ from tænia, except perhaps that the former is less opaque than the latter, and when placed in alcohol has a semi-opaline or grayish tint.

The bothriocephalus latus is peculiar to the inhabitants of Switzerland, Russia, and Poland, and of those parts of France which border on Switzerland. Hence it does not come under the notice of British practitioners, except as it occasionally occurs in the natives of those parts visiting this country, or in the case of our own countrymen who may have resided for a time abroad. This circumstance has been already alluded to as favouring the idea of the external origin of worms; and although the truth of it has been questioned, yet several examples might be quoted in proof of the possibility of peculiar species being thus transported from one country to another. A case of this kind lately occurred in the practice of Dr. Latham. A young lady, a native of England, had resided for some time in Switzerland, where she became subject to tapeworms, some of which were passed by stool. After her return to this country she still manifested symptoms of worms, and this circumstance, with the knowledge of her former history, led to the administration of oil of turpentine, which brought away a portion of a bothriocephalus latus several feet in length.

The *symptoms* and *treatment* of this species do not require to be noticed apart from what has been said of tænia solium.

9. *Distoma* (δις, *bis*; στομα, *os*) *hepaticum*. This is commonly termed the fluke or liver fluke. Its seat is the gall-bladder and biliary duct, where it has been occasionally observed in man, and is very common in the same situation in many quadrupeds, especially in sheep, and is connected with the state called " the rot" in those animals. In form it is flattened, ovate, and elongated, somewhat pointed toward either extremity. Its under surface presents three cavities or apparent pores: the posterior one is larger than the rest, transversely oval and imperforate, being destined only for the purpose of adhesion or locomotion. The anterior pore, which is round and small, is the true mouth, and is connected to the body by a short neck. The middle pore

is for the purpose of generation, and is therefore analogous to the lateral pores of tænia, and the central pore of bothriocephalus. The animal is of a yellow or light brown colour. The centre of the body is mainly occupied by digestive canals. From the anterior pore or mouth the œsophagus is continued, forming, a short, wide and somewhat funnel-shaped tube, leading to a double intestinal canal. From the outer side of these canals short and wide cæcal processes are sent off, which ramify to the end of the body, but have no anal outlet. According to the observations of Rudolphi, when these digestive canals are successfully injected, more minute vessels may be seen to be continued from their apices, ramifying and forming a network over the surface of the body, and thus presenting the rudiments of a vascular system. This parasite is supposed to feed upon the bile, or perhaps upon the mucus of the gall-bladder and ducts. Besides the digestive canal, there are separate seminal and ovigerous tubes which terminate at the pore already described; and from which there may be generally seen protruding, in the full-grown specimens, a small cylindrical process or lemniscus. Reciprocal fecundation takes place in these animals, and the ova escape by an aperture situated near the base of the projecting spiculum or penis.

The flukes have been found in considerable numbers, but do not appear to give rise to any characteristic symptoms. They have been passed during life, as in the case of a girl twelve years old treated by Chabert, with his empyreumatic oil, which caused the expulsion of a great number of them.

A second species of distoma was described by Rudolphi under the term *lanceolatum*, but is no more than the young of the distoma hepaticum.

10. *Polystoma* (πολυς, *multus*; στομα, *os*) *pinguicola*. This has been met with but once in the human subject. It was discovered by Treutler in the cavity of an adipose tumour, connected with the left ovarium of a female aged 20, who died in childbed. The cavity was nearly filled by the worm. It is about three-quarters of an inch in length, flattened, and rather convex above, and concave below: truncated towards the head, and pointed towards the opposite extremity. On the under part of the head are six pores arranged in a crescentic form. A suctorious cavity is situated on the ventral surface near the tail, at the extremity of which is also another pore. Treutler has also described another species under the name of *polystoma venarum*, which he states to have been found in the anterior tibial vein of a man which ruptured while bathing. But this was probably a *planaria* which had been accidentally introduced there.

Class Cœlelmintha (κοιλος, *cavus*; ελμινς, *lumbricus*).

This class comprehends the "cavitary" or hollow cylindrical worms, as distinguished from the foregoing, which are the solid worms. They constitute a more highly organised group of animals, possessing a distinct alimentary canal, having its proper parieties separate from the walls of the body, and contained in a visceral cavity which is bounded by muscular parieties. The mouth and anus are always separate, and generally at opposite extremities of the body. The organs of generation are extensively developed, and are placed on separate individuals. Most of these species have also a distinct nervous system.

11. *Trichina spiralis*. This remarkable entozoon exceeds, in minuteness of form and in numbers, every other parasite of the human body. Its seat is the muscular system. It appears to have been first publicly noticed in 1833, by Mr. John Hilton, in a subject dissected at Guy's Hospital, the muscular system of which he observed to be studded with the minute cysts of the *trichina*, which he imagined to be *cysticerci*, but in which "no organization could be discovered with the aid of the microscope; probably on account of the opacity of the cysts preventing a view of the contained worm." (*Lond. Med. Gaz.*, vol.

xi., p. 605.) The entozoon itself, therefore, remained unknown until two years afterwards, when its nature was investigated by Mr. James Paget and Mr. Owen, on the occasion of the body of an Italian, which was infested with these parasites, being brought into the dissecting room of St. Bartholomew's Hospital. The singular appearance produced in the muscular system had been previously noticed on several occasions, but no idea had been entertained of its animal nature, until the existence of the worm was satisfactorily demonstrated by the independent observations of Mr. Paget and Mr. Owen, the latter of whom published a minute description of the parasite in the *Transactions of the Zoological Society of London*, vol. i., p. 315, and named it accordingly. Our own observations on the minute structure of this entozoon will be found in the *London Medical Gazette*, vol. xvii., p. 382. Since the period of its discovery, the *trichina* has been observed in many of the subjects examined in the various dissecting rooms in London : but even still, on account of its extreme minuteness, it is probably often overlooked.

The cysts are generally so numerous as to give to the muscles in which they are found a peculiar gray speckled appearance, as if the part had been thickly sprinkled with the eggs of some small insect. They are seen to consist of minute white ovate grains, which require the aid of the microscope for their examination. If a small portion of the infected muscle be laid upon a strip of glass, or compressed between two glasses, and examined by transmitted light with a single lens of a half or quarter inch focus, or a compound power of an inch focus, the cysts are observed to be arranged with their long axes parallel to the course of the muscular fibre, and closely adherent to the interfascicular cellular tissue ; this adhesion being closest at either extremity of the cyst, so that they are not easily detached. The cysts are generally about one-thirtieth or one-fortieth of an inch in their larger diameter, and from one-third to one-half in their length in their shorter diameter. They are in form elliptical, attenuated towards the extremities, which are opaque and bulging in the centre, which is usually transparent. The opacity is due to the presence of earthy matter, which is often so abundant as to produce a gritty feel in pressing the cysts under the dissecting needle. When the cysts are sufficiently transparent, the outer cyst is seen to be occupied by an inner one of a more regular elliptical form, which by practice in the manipulation can sometimes be detached from the outer one : but, without this process, the inner cyst may generally be seen to be occupied by a minute worm coiled up in its interior, and disposed in from two to three spiral turns ; the two extremities of the worm pointing generally to the centre of the short diameter. The cysts present many varieties in form ; sometimes they have only one opaque extremity, and sometimes both are absent. In general, each cyst contains only a single worm ; but in one subject which we have dissected most of the cysts contained two worms ; and one contained three. The cysts are often so opaque as to prevent the worm from being seen through its walls, and sometimes the cysts are found when cut open to contain only a granular fluid. The worm itself when extracted from the cyst, which it occupies in common with some granular fluid, and extended on a piece of glass, is found to measure generally one-thirtieth of an inch in length, and about one seven-hundredth of an inch in diameter. It is cylindrical and filiform, terminating obtusely at one extremity, but tapering toward the opposite end for about one-third of its length, and ending in a point. According to our own observations, the worm possesses a distinct alimentary canal. Commencing from the large end of the worm, the canal is seen bounded by two slightly irregular lines, running parallel to each other for a distance of about one-third or one-fourth of the length of the body, where they terminate in a transverse line, presenting a slight concavity toward the larger end, and indicating the termination of the first portion of the canal. From this point the canal assumes a sacculated form, and these sacculi appear as if bound down by a line extending along the surface of the canal in the direction of its axis. This

line is not dissimilar to the longitudinal bands of the human colon, but may possibly be a nervous filament. The sacculated character of the intestine becomes gradually lost towards the smaller end, where the part assumes a zigzag or spiral course, and at length terminates in the smaller end.

In some instances where the worms were alive when examined, the intestine was seen to be drawn backwards and forwards several times within the body of the worm; and if the worm be cut across, this part may be observed to protrude to a considerable extent from the divided extremity. An aperture was repeatedly observed at the larger extremity, which, when viewed laterally, had a notched appearance; and, occasionally, appearances were observed indicating a smaller aperture at the opposite end of the worm. At about one-fifth of the entire length from the blunt end, a small group of granules was, in most instances, observed occupying about half the diameter of the worm, and probably constituting an ovarium. The worms, if examined recently, are generally found to be alive, and will continue to live, sometimes, for several days after the death of the individual in whom they are found; and, in one instance, they were observed to move after the portion of muscle from which they were extracted had been immersed for a day in spirit.

The singular locality of the entozoon, and the immense numbers in which it is found thus occupying the muscular system, suggests, more directly perhaps than any other species, the question as to its origin; but, unless we admit its spontaneous production, there is no other way for accounting for its presence than by supposing that its ova or germs must have circulated with the blood, and have been thus distributed through the muscles; and if we admit the little granular bodies already described to constitute the germs, then there is nothing unreasonable in such a supposition, since the size of these bodies is such as to allow of their readily passing along the minute blood-vessels. It is considered by Mr. Owen that the *trichina* is not a distinct and perfectly grown species, but is probably the young of some other genus, perhaps a *strongylus*.

All parts of the muscular system do not appear to afford an equally favourable nidus for the developement of this parasite. The superficial muscles are found to contain them in far greater numbers than the deep-seated ones, and especially the broad flat muscles, as the pectoralis major and latissimus dorsi. They are generally present, however, in a greater or less degree, in all the muscles of the trunk and extremities, and have been found in those of the eye, and external and internal ear, in the tongue and soft palati, the constrictors of the pharynx and the œsophagus, the crura and the radiated portion of the diaphragm, in the levator and external sphincter ani, and the muscles of the urethra. Indeed, the only muscular structures that seemed free from them were the heart and muscular envelope of the stomach, intestines, and urinary bladder, together with one or two other exceptions. The outer cyst, in all probability, does not properly belong to the worm, but may be supposed to be formed around it by the adjacent parts after the usual manner of entozootic cysts; but it may be questioned how far the inner cyst is formed in the same way, or whether it may not rather be looked upon as constituting a proper envelope to the embryotic worm.

The history of the cases in which the *trichina* has been found does not afford any clue which might serve to explain the cause of their presence. They have been found equally in the diseased and in the healthy; in those who have died from chronic disease attended by atrophy, and in those who have been cut off in robust health by some violent accident, as fracture of the skull. They have been also equally observed in the dead-house of the hospital when the examination has been made a few hours after death, and in the dissecting room where it has been delayed for some days. No symptoms have been in any case manifested during life which could lead to the supposition of their existence, and in all cases the individuals themselves appear to have been unaware of their presence.

To those who may have the opportunity of examining this remarkable ento-zoon, which appears to have been so long overlooked, probably on account of its minute size, the following observations, as to the best method of pursuing the investigation, may not be without use. To examine the worm, a very thin slice of the muscle, containing about half a dozen cysts, should be placed upon a slip of glass, with a drop of water. This being placed on the stage of the microscope, under a lens of a half or a quarter of an inch focus, one of the cysts is to be separated from its attachment to the surrounding cellular tissue, by means of a couple of needles fixed in handles, leaving it however adherent at one extremity, which serves to fix it, while the other is cut off by a cataract needle, or other fine and sharp instrument, so as to open the inner cyst, but without injuring the worm. This is the most delicate part of the operation, and requires some practice to effect it dexterously. As soon as the cyst is opened, the worm, which is free within it, generally starts out, from the pressure used during the operation ; or its expulsion may be effected by a very gentle pressure upon the opposite extremity of the cyst. Every thing being then removed from the glass except the worm, this is to be covered by a very thin piece of talc, taking care that there is sufficient water between the talc and glass to prevent the worm being injured by pressure. The object may then be examined by a power ranging from 200 to 500 linear measurement, always using daylight in preference to any other. These examinations should be made, if possible, upon the living worms, at least as far as the internal parts are concerned, since the natural appearances are often entirely lost when the worms are dead, or they are replaced by others, which are likely to convey erroneous impressions. The living worms, moreover, will uncoil themselves, so as to admit of their structure being more clearly seen than when two or three coils are lying over one another, as in the usual position of the animal. The uncoiling, however, may generally be effected by means of a couple of hooked needles.

The cysts are best examined by placing the thinnest possible slice of muscle between two slips of glass, or one of talc and one of glass, and slightly pressing them, so as to distribute the muscle in a thin layer. If the edges of these are surrounded by white paint, so as to prevent evaporation, the specimens may be preserved for several months, but become at length decomposed. This method is far preferable to that of drying and placing them in Canada balsam, which renders the cysts too transparent.

12. *Filaria medinensis*. The Guinea, or hair-worm. This worm is de-veloped in the subcutaneous cellular texture, chiefly of the lower extremities, especially the feet, and in the scrotum, but has also been occasionally found in the abdominal and thoracic parietes, about the head, neck, arms, hands, and even beneath the conjunctiva of the eye. In length the worm varies from about six inches to twelve feet : its diameter, which is nearly equal throughout, is half a line or rather more, being a little attenuated towards the anterior ex-tremity, where the mouth is situated, surrounded by a slightly raised lip. The opposite extremity is obtuse in the male, and furnished with a spiculum ; but in the female it is acute, and more suddenly inflected. The body is round, sometimes of a whitish colour, but more often dark brown. The external tunic is of a fine elastic texture, and marked by minute circular striæ, which are probably muscular fibres. Within this are readily seen the longitudinal mus-cular fibres arranged in two bands, and separated from each other by two longitudinal depressions, one on each side of the body, which are conspicuous externally. Dissection has, in many instances, failed in detecting either diges-tive or generative tubes in the interior of this species, though they have been frequently found completely filled with young, their generation being vivi-parous. These young *filariæ* appear to be contained in the free cavity, or muscular envelope of the body, along with some granular matter, but without any specific covering, or enveloping tube ; and Rudolphi states, that he has met with *filariæ* thus stuffed with countless thousands of young progeny.

The worm appears to be capable of slowly changing the positions which it occupies in the cellular tissue, and probably its extrusion is effected by a process of inflammation and suppuration, as in the case of other foreign bodies. It usually occurs singly, or in small numbers. From ten to twelve, however, is in some localities not an uncommon number; and even as many as fifty have been met with in a single individual. It appears to be a parasite peculiar to warm climates, and is most abundant in Arabia, Upper Egypt, Abyssinia, and Guinea. It usually attacks the natives, but Europeans and others visiting these parts have occasionally become infected with it; and in some districts it has prevailed to such an extent as to affect one-fourth part of the population. The idea that it is capable of being communicated by contagion has been entertained by many who have had competent opportunities of making observations on that point; but as to the source from which it is derived, but little satisfactory knowledge has been obtained. It has been supposed by some to be introduced in the form of ova in the drinking of stagnant water; and many writers have thus attributed its presence to the use of water of bad quality; and it appears pretty certain that dogs kept in hospitals, and fed on the poultices with which the sores produced by filariæ have been dressed, have become affected with this species. On the other hand, the native inhabitants, still attributing it to the water, and noticing its abundance in the rainy season, have generally supposed that it is introduced through the skin, especially while bathing: and it has also been observed that the water-carriers in India frequently suffer from this parasite, which more particularly infests the skin of the back at the part which is kept continually wetted by the leathern water-bottle being frequently in contact with it.

The Guinea-worm does not appear generally to excite any very prominent disorder of the part immediately on its introduction, but may lie dormant, or perhaps undeveloped, at least without manifesting any signs of its presence, for a period of several weeks or months. The first symptoms are generally those of uneasiness, or itching in the part occupied by the worm; which is sometimes attended by a slight cord-like elevation indicating its seat; to this succeeds the formation of a vesicle or pustule, which breaking and discharging more or less fluid, at length gives exit to the head of the worm, at the same time that a certain amount of constitutional disturbance is often experienced by the patient. The suppurative process is often attended by considerable swelling of adjacent parts, and the pain experienced is at times very severe.

The treatment consists in aiding the expulsion of the worm by careful manipulation. If the worm is short, and the texture of the part which it occupies loose, as the scrotum, it may sometimes be extracted at the first attempt; but more often its removal is a tedious process, extending over a period of many weeks. It has been usually recommended to allow the worm to make its way spontaneously to the surface, and then, as soon as any hold can be obtained upon it, to gently draw it forwards until some resistance is felt, and then to prevent its retraction by winding the protruded portion round a piece of adhesive plaster on a bit of stick or bougie, which is to be kept in contact with the aperture and covered by some light dressing, the attempts being renewed once or twice daily until the whole has been extracted. When the worm is seated near the surface, the process of extraction may be much accelerated by cutting down, as nearly as can be guessed, upon the middle of the worm, and so commencing the traction from its centre.

The object of this caution in extracting the worm is to prevent its being broken; an accident which appears to be generally followed by violent inflammation and the formation of abscesses and sinuses in its course, accompanied by much constitutional disturbance. These serious consequences were supposed by Hunter to be caused by the contact of the dead animal with a considerable extent of living surface: but from what has been said of the structure of the worm, it will be readily seen that its rupture, or breaking across, must be fol-

lowed in many cases by the escape of thousands of young *filariæ* into the wound ; a circumstance quite sufficient to account for the degree of mischief thus produced. The fistulous ulcer generally heals rapidly after the extraction of the worm.

13. *Filaria oculi.* This species was observed by Nordman in the human subject. A patient of Baron von Gräafe had undergone the operation of extraction, and the crystalline lens had been brought away with its capsule entire. On opening this half an hour afterwards, there were found in the liquor Morgagni two minute and delicate *filariæ* coiled up in the form of rings. The more perfect one of these measured only three-fourths of a line in length, having a simple mouth, without projecting papilla, and the body so transparent as to allow of the straight alimentary canal being seen through the parietes, surrounded by the tortuous ovigerous tubes, and terminating in a curved anal extremity. A larger species of filaria is not unfrequently met with in the eye of the horse.

14. *Filaria bronchialis.* This, like the former species, has been met with only once in man, when it was observed by Treutler in an enlarged bronchial gland of a phthisical patient. The worm was about an inch in length, and curved somewhat in the form of the letter S ; its colour dark brown with white spots. The body was somewhat flattened, attenuated towards the head, but obtuse at the anal extremity, which emitted a male spiculum. It is described by Treutler under the name of *Hamularia lymphatica.* (*Opusc. Pathol. Anat.* p. 10, tab. 2. f. 3—7.)

15. *Tricocephalus* (Θριξ, *capillus* ; κεφαλη, *caput*) *dispar.* This worm is commonly found in the cæcum and large intestine, but has been detected in every part of the alimentary canal as high as the pylorus. It is sometimes called the long thread-worm. The body of the male, which is smaller than the female, is generally found spirally convoluted in the same plane. It measures, when uncoiled, from one to two inches in length. The anterior capillary portion of the body is exceedingly slender, and forms about two-thirds of the length of the worm : it is occupied along the centre by the simple straight alimentary canal, terminating in a small orbicular mouth. The capillary portion bulges somewhat suddenly into the main part of the body, which contains a sacculated or moniliform intestine. The body terminates in an obtuse anal extremity, which in the male bears a projecting intromittent spiculum, furnished with a sheath ; but in the female exhibits only a simple foramen, serving for both anus and vulva. In the former, the tortuous spermatic vessels, and in the latter, the oviducts containing elliptical ova, are seen terminating at these points.

Dr. Baillie speaks of this worm as of rare occurrence, not only in this but in every other country ; and previously to the year 1760, when it was discovered in Germany, it appears to have been totally unknown. Yet there is probably no other human entozoon of so frequent occurrence as this ; and we must therefore suppose, that on account of its comparatively delicate form it has been generally overlooked. Of twenty-nine bodies examined by Dr. Bellingham of Dublin, at St. Vincent's Hospital, the worms were found in greater or less number in twenty-six. During the mortality of the cholera at Naples, M. Thibault took the opportunity of examining them, and in eighty cases examined, many of the individuals having died of other affections than the cholera, the worms were found in the alimentary canal in all without exception. And, according to Mr. Curling, during the winter before last, they were detected at the London Hospital " in nearly all the cases in which much pains were taken in looking for them, in the intestinal canal of healthy persons destroyed by severe injuries, as well as those cut off by acute and chronic diseases." (*Med. Chir. Trans.* vol. xxii. p. 285.) They are often found in considerable numbers, and either loose, or having the long filiform anterior extremity of the body imbedded in the substance of the mucous membrane, while the posterior portion floats freely in the cavity of the intestine. It is remarkable that they do not appear, in most cases at least, to give rise to any symptoms indicative of their

presence : and that they are found as well in those who have died from violence or acute disease, as of more lingering affections.

16. *Spiroptera hominis.*   This worm has been already alluded to as having been expelled from the urinary bladder of the woman whose case is mentioned under the head of *Diplosoma crenata* (p. 610).   The *spiroptera* was met with only during the earlier progress of the case, and has long ceased to be passed, though the other form of worms by which it was accompanied is still occasionally evacuated.   This worm is known chiefly by the description given of it by Rudolphi, to whom some specimens were transmitted in a phial for the purpose of examination.   They were found to be of different sexes ; the males eight and the females ten lines in length, of a white colour, slender, and very elastic.   The head, rather truncated, is furnished with an orbicular mouth, and one or two papillæ.   The body is attenuated towards each extremity, but especially towards the head.   In the female, the posterior extremity has a short obtuse apex, and is thicker than that of the male : in the latter, there is at this point a short tubulus, which is probably the sheath of the penis.   Near the tail there is the dermal aliform structure characteristic of this genus.

From the same patient from time to time have been expelled with the urine a number of granular bodies of tolerably uniform size, which are considered by Rudolphi to be merely " lymphatic concretions."   From our own observations however of these substances we have no doubt that they are distinct ova, but whether belonging to either of the worms voided from the bladder, the circumstances of the case do not warrant us in determining.   They appear far too large to have belonged to the *spiroptera*, while with regard to *diplosoma*, no trace of ovarium, or indeed of any cavity or tube for the purpose of containing ova, could be discovered in this remarkable entozoon.   The ova continued to be passed long after the *spiroptera* ceased to appear, and have now in their turn also ceased to be produced.

The ova are about one-third or one half of a line in diameter.   Those which have been long in spirit are of a brown colour, and have many flattened sides ; but the more recent ones are white, and perfectly spherical.   They consist of an external smooth covering of firm texture, enclosing a mass of granular matter.   This investing tunic is found, upon examination with the microscope, to consist of an arrangement of cells of a most beautifully regular hexagonal form, which are more readily seen upon the inner surface, and in those parts which are the thinnest and most transparent ; and as this structure may be observed in almost all the more recent specimens, which possess moreover the usual characters and form of ova, we cannot with Rudolphi regard them as accidental formations.

17. *Dactylius* (δακτυλιος, *annulus*) *aculeatus.*   This parasite was first described during the past year by Mr. Curling, who received specimens of the worm from Mr. Drake, surgeon, of the Commercial Road.   The worms, of which a minute description will be found in the *Med. Chir. Trans.* vol. xxii., p. 275, began to be passed by the patient, a little girl five years of age, during convalescence from a slight attack of fever.

The worms were found in the urine, which was high-coloured and slightly acid.   There was no corresponding derangement of the urinary or any other organs, and the discovery of the worms was quite accidental.   When first passed they floated separately in the urine, but in a short time they coalesced, and coiled themselves up together in the form of a ball, at the bottom of the vessel, and it was with difficulty that they could be separated.   When disturbed, their motions were often lively, and if allowed to remain in the urine they lived for two or three days.   They were very transparent, and of two sizes, the larger worms being more numerous than the smaller.

The worm is of a light colour, annulated, cylindrical, but tapering slightly towards both extremities, chiefly towards the anterior, which is the smaller. The female measures about four-fifths of an inch in length ; the male, as is the

case with most of the nematoid worms, is smaller, being about two-fifths of an inch long. They varied, however, a good deal in size. The head of the worm is obtuse and truncated, and has an orbicular mouth ; the neck is distinctly annulated ; the tail is obtuse, and also annulated, but not so much so as the neck. The tegument is a delicate transparent structure, containing two layers of fibres, one circular, and the other longitudinal. It is armed with a number of sharp-pointed spines, arranged in clusters of three, four, and sometimes five, in longitudital equidistant rows. The worm appears to have the power of protruding and retracting these spines at will ; the motions being effected apparently by a number of fibres radiating outwards in the substance of the tegument. The alimentary canal, which was of a yellow or brown colour, appeared to commence at the mouth by three small convoluted tubes, which were shortly afterwards united into a single one. This tube, after proceeding some distance in a tortuous course, became sacculated, enlarging in its descent, and terminating at the extremity of the tail in a trilobular anus. A very free movement of the alimentary canal was observed, and the sacculi were seen to close and dilate by a sort of peristaltic action. By the side of the alimentary canal was observed a pulsating tube, probably analogous to the dorsal vessel of the annelida ; and currents of minute globules were seen passing in various directions between the intestinal canal and the external tegument.

The structure of the female worm is much more complicated than that of the male. The vulva is situated near the anterior extremity, about one-fifth of an inch from the head, where it forms a mamillated process, and the body swells out at this part. The oviducts consist of two small tubes, commencing at the vulva, and pursuing a tortuous course round the alimentary canal as far as midway between the anus and vulva.

18. *Strongylus gigas.* This is by far the largest of all the entozoa belonging to the class *Cœlelmintha*. It has been known to measure a yard in length, with a diameter of half an inch. More frequently, however, it is found from twelve to fifteen inches long, and about two or three lines in diameter. Its seat is the kidney, the parenchymatous structure of which is generally found to be more or less destroyed ; and in one specimen preserved in the museum of the Royal College of Surgeons, nothing but the proper capsule of the kidney remains, forming a cyst around the worm, which in this instance is remarkably large.

The male strongylus is smaller than the female. The body is attenuated at each extremity ; it is marked by circular striæ, and has two longitudinal depressions, marking the arrangement of the tegumentary muscular fibres. The head is obtuse ; the mouth orbicular, and surrounded by six hemispherical papillæ. The tail is strongly incurved in the male strongyle. terminates in a dilated pouch or bursa, from which projects the intromittent spiculum or penis. In the female, the tail is less curved and less attenuated ; the anus is placed a little below the extreme point, but the vulva is situated about two inches from the anterior extremity of the body. These characters will serve to distinguish this worm from the *ascaris lumbricoides*, with which it has been sometimes confounded.

From the mouth, situated between the six papillæ, begins the œsophagus, round, and slightly tortuous, which, after proceeding about two inches backwards, suddenly dilates into the intestinal canal, apart from which there is no distinct gastric cavity. The intestine is not cylindrical but quadriform, and from its four angles pass off an equal number of longitudinal mesenteric processes, which are attached to the abdominal parietes. The inner surface of the abdominal parietes is covered by minute papillæ, which are supposed to imbibe the nourishment that may exude from the alimentary canal, and carry it to four longitudinal vessels, which occupy at equal distances the muscular integument. The alimentary canal is nearly of equal diameter, from the termination of the œsophagus to the anus. The female possesses a single tortuous

ovary. It commences near the anus in a blind pouch, and, after forming two long loops about the middle of the body, proceeds forwards, and suddenly dilates into a receptacle or uterus of three inches in length, which again contracts for an inch, to form a slender cylindrical vagina terminating at the vulva near the head, as already described. In other species the oviducts are double. The nervous system consists of a slender collar or ring surrounding each extremity of the alimentary canal, and having a single connecting cord running along the ventral aspect of the body. A great variety of strongyles are met with in different parts of animals.

The worm appears in some instances to cause great suffering, and its presence has been generally attended by bloody urine, which symptoms have ceased on the passing of a worm by the urethra. Bremer has mentioned several cases of this kind. The worm has also occasionally caused retention of urine, probably from becoming engaged in the urethra. In one case related by Roux, the worms were discharged from the kidney, by the formation of a fistulous opening outwardly.

19. *Ascaris lumbricoides.* The round worm. This worm was described by Hippocrates under the name of ελμινς στρογγυλος. It is commonly spoken of as the *lumbricus*, but differs from that genus in many important particulars. It is often met with in children, especially those who are ill-fed, in whom it is more common than in adults; but in the aged it is comparatively rare. The seat of this worm is properly the small intestines, but it sometimes makes its way into the stomach or œsophagus, and even into the posterior nares, trachea, and bronchi, and has been found in the biliary and pancreatic ducts, and gall-bladder.

The worm varies generally from six to nine inches in length. The body is round and smooth, of a white or yellow colour, and attenuated towards either extremity, but more particularly at the anterior one. The head is furnished with three tubercles which surround the mouth, and which will at once serve to distinguish this entozoon from the *lumbricus* or common earth-worm. The anus is situated close to the extremity of the tail, which terminates more obtusely than the head. The female is distinguished from the male by having the posterior extremity straighter and thicker, and not abruptly curved inwardly as in the male; and by having a constriction at about one-third of the entire length of the head, at which point the vulva is situated. The male is also smaller, and much more rare than the female.

The worms, when recently voided, are more transparent than when preserved in spirit, so that the viscera may often be seen through the parietes. The integument is marked by numerous circular fibres, indicating the course of the muscles, and also by four longitudinal lines which extend at equal distances from the head to the tail, and indicate the course of the nerves and vessels. The dorsal and abdominal lines correspond to the nervous cords, which commence at a circle of nervous matter surrounding the œsophagus, and pass downwards, to be distributed along the whole course of the body. The lateral lines commence on each side of the mouth, enlarging in their course, about the centre of the body, and denote the situation of the main branches of the vascular system.

The œsophagus is muscular, narrow, and about four or five lines in length, and separated by a constriction from the rest of the alimentary canal. The intestine becomes narrower about the middle of the body, where it is surrounded and pressed upon by the tortuous generative tubes, but again gradually enlarges to within a short distance of its termination. The intestine is thin and easily lacerable, and is connected chiefly at its upper part by slender radiated filaments to the muscular parietes; similar papilliform processes to those described in the strongylus are here met with, but larger and more numerous. They are found chiefly in the dorsal and ventral regions, and are continued from numerous transverse bands which pass across the body from one side to the other.

The generative organs in the female are very extensively developed: they consist of vulva, vagina, uterus, and tortuous tubular ovaries. The vagina commencing at the vulva, is a narrow, slightly wavy canal, about half an inch long, and leading to a very short uterus: this soon branches into two ovarian tubes which, somewhat tortuous, proceed backwards to near the tail, where they gradually diminish, and then becoming again inflected forwards, form a tangled coil of exceedingly minute vessels, each of which, when unravelled, measures as much as four feet in length. In these tubes are contained the ova. A somewhat similar structure is found in the male, constituting the testes or seminal tubes; it is convoluted, like the ovarian tubes of the female, and measures from two to three feet in length; the tube, however, is single. At its base is a seminal reservoir about an inch in length, communicating with the penis, which projects from the anterior part of the anus, in the form of a slender, conical, slightly curved process, furnished at its extremity with a minute pore.

These worms are considered to feed upon the mucus of the intestines, the quantity of which is probably much increased by their presence. They often occur alone, but have been sometimes met with in great numbers. Frank mentions a case where eighty of them were voided in a mass by an individual suffering from fever; and Dr. Hooper has known more than two hundred of this species to be passed in the course of a single week.

The symptoms caused by the *ascaris lumbricoides* are principally those which have been already enumerated under the head of general symptoms. Dr. Heberden has given the following enumeration of them:—Pains in the head, vertigo, torpor, disturbed dreams, sudden waking from sleep with fright; convulsions, fever, thirst, pallid countenance, unpleasant taste in the mouth, fetid breathing, difficult breathing, itching of the nose, pains in the stomach, nausea, deranged appetites or great craving for food, emaciation, tenesmus, itching at the anus towards evening, followed by discharge of mucous dejections mixed with pellicles. Dr. Baillie considers the most characteristic symptoms to be the swelled belly, emaciated extremities, depraved appetite, slimy stools, frequent picking of the nose, and grinding of the teeth during sleep.

The treatment of this species consists chiefly in the employment of active purgatives and bitter tonics. The purgatives most in use are calomel, jalap, scammony, aloes and rhubarb, variously combined. For general use the conjunction of calomel with jalap is preferred, from two to four grains of the former being combined with from four to fifteen of the latter, according to the age and constitution of the patient. Rhubarb may be often substituted with advantage for jalap, or added to the purgative if the quantity of jalap be diminished; and where it is necessary to repeat the purgative powder often, rhubarb is in most cases a preferable medicine. Scammony, aloes, and rhubarb, form also a combination in very common use as a vermifuge. The action of these powders may be aided by castor oil, or the infusion of senna with some of the purgative tinctures added to quicken its effects. Care should be taken in the exhibition of purgatives not to exhaust the tone of the mucous membrane, which is already often enfeebled, and to support this, it is often necessary to combine bitter tonics and light purgatives. The tonics best adapted to these cases have been already mentioned under the head of general treatment. The addition of an alkali will often aid in correcting a feeble or depraved condition of the stomach and bowels. These combinations may be given in the form of an electuary containing rhubarb with carbonate of iron, and some of the bitter extracts, or in a draught, composed of infusion of rhubarb in conjunction with soda and some bitter tonic.

Each writer on verminology appears to have his favourite remedy, but they are almost all of them combinations of the medicines already enumerated, which also form the principal ingredients of the most approved empirical remedies. Hoffman generally employed a combination of assafœtida, extract of rhubarb,

tansy, aloes, myrrh, and calomel. A drachm of each of these, with four grains of extract of saffron and the same of castor, was to be mixed together, and each scruple of this to be divided into fifteen pills, of which from five to eight were the dose. Bremser speaks very highly of the following formula, which he says he has rarely occasion to repeat: ℞ Semin. Santonici et Sem. Tanaceti rude Contus. āā ℨss; Pulv. Valerian. ℨij; Jalapæ ℨiss—ij; Potass. Sulph. ℨis—ij; Oxymel Scil. q. s. ut fiat electuarium. A teaspoonful of the electuary is given night and morning for three or four days, or until an ample purgative effect is produced. The disagreeable taste of the electuary may be avoided by forming the mass into pills. He occasionally substitutes a more active purgative; and when there is much debility, follows up the treatment of the case by a ferreous tincture.

The mechanical anthelmintics, cowhage and powdered tin, have been recommended chiefly against this species. The mode of exhibiting the former has been already mentioned. The filings or grains of tin, recommended chiefly by Dr. Alston, are exhibited in scruple or drachm doses mixed with treacle, three or four times a day, for four or five days, and followed by a brisk purge. Neither of these remedies are now much used.

Oil of turpentine, which is so valuable a remedy against tapeworm, will also sometimes succeed in the removal of the round worm. It is mentioned by Mr. Rumsey in the paper already quoted, as successful in bringing away a hundred and twenty worms from a child. He gave it in small doses in the form of emulsion.

The use of common salt as an anthelmintic is of ancient date; and its virtue, in preventing the occurrence of worms in low and damp countries, is supported by good authority. It is considered to constitute the main virtue of the various sea weeds that have been recommended as vermifuges. Nash states, that he has given it with great success; he exhibited it in half drachm doses upon an empty stomach, until many pounds were consumed.

The bark of the *Geoffroya inermis* or bastard cabbage tree of Jamaica, and the powdered root of *Spigelia Marylandica* or Indian pink, have been recommended as efficient vermifuges, but as these are seldom or never employed in England, and are inferior to the remedies already named, it does not appear necessary to give any specific rules for their exhibition.

Enemas are seldom used in the treatment of this species.

20. *Ascaris vermicularis.* The thread-worm or maw-worm. This entozoon is mentioned by Hippocrates under the name which it still bears. It is the smallest of the worms inhabiting the human intestine. The males do not exceed two lines in length; the females are larger, measuring about five lines; they are very slender and elastic, and of a white colour. Rudolphi has repeatedly observed the head of this worm to be furnished with the three valvular papillæ characteristic of the genus *ascaris;* but Lamark and Bremser not observing this have referred it to the genus *Oxyuris.* The head is also furnished on each side with a semi-ovate membrane. It is narrower in the male than in the female. The body diminishes gradually towards the tail, which is slender and pointed in the female, but in the male obtuse, thicker and spirally inflected. The integument is often sufficiently transparent to allow of the internal organization being seen through it, which does not differ in any material respect from that of the species last described.

The rectum appears to be the peculiar seat of this parasite, though it is often found also in other parts of the large intestine, and sometimes it creeps into the vagina or urethra. It is found in individuals of all ages, but young children are more especially liable to it. It occurs generally in large numbers, and masses of them are often expelled enveloped in mucus, or rolled into a ball.

The distinguishing symptoms of the presence of these worms, is the intolerable itching of the anus, coming on chiefly in the evening, recurring often with singular precision, and increased by warmth or exercise. Accompanying

this, there is sometimes a dull or lancinating pain in the part, which is frequently rubbed to relieve the itching, and hence arise small tumours about the anus, resembling piles, but of a solid texture. The irritation about the anus is productive of frequent calls to stool, and slimy mucous evacuations are passed, sometimes mixed with blood. These are often the only symptoms caused by ascarides; but sometimes the appetite is depraved, digestion weak, pains in the head and stomach are felt, with giddiness, faintings, sickness, gripings, itchings of the nose, cough, offensive breath, and disturbed sleep. More rarely the symptoms have been of an alarming nature, and the nervous system has been extensively deranged, the symptoms subsiding on the evacuation of the worms. The more severe irritation caused by this worm as compared with others, is probably to be accounted for by the circumstance of the worm being apparently in perpetual motion, and on account of this restlessness and activity, it has acquired its generic name, from ασχαριζειν (σχαιρω), to leap.

The treatment of *ascarides* will be found in most cases to be attended by less satisfactory results than that of any other species of intestinal worm. On account of their minute size, it is extremely difficult to dislodge them from their positions; and even when we may have effected the removal of the greater part of them, and so have afforded a temporary relief, yet those that remain behind will multiply so fast, that, in a short time, the symptoms will return with their former severity, and thus individuals will continue, even for a long life, to be troubled with these annoying parasites. It is fortunate, therefore, that their presence is not usually followed by any very considerable disturbance of the vital functions, though in most cases, and especially in persons of irritable temperament, they cause a considerable amount of discomfort, and often embitter the patient's life. To remove these parasites purgatives, given by the mouth, will frequently be found to be insufficient, when trusted to alone. The seat of these worms is especially local, and they require local treatment. Hence glysters of various kinds constitute the most striking feature in the treatment of ascarides. These are given either with a view of removing the parasites by their purgative action, or of destroying them in situ. Hamilton recommends enemata consisting of aloes suspended in milk, or of decoction of chamomile flowers, with salt and castor oil. The enemata used by Macbride were composed of decoction of wormword and rue, or aloes and oil. Injections of turpentine, camphor, and essential oils, mixed with yolk of egg, and suspended in water or plain lime-water, have been preferred by others. Chabert's oil administered in the same form, in the quantity of two teaspoonsful in a mucilaginous decoction, has been recommended, while benefit has been in some instances derived from the natural sulphurated waters, as those of Harrowgate, both in the form of enemata, and given by the mouth; or injections of sulphuretted alkali have been used. Dr. Darwall speaks in high terms of chalybeate enemata, and recommends for this purpose, a solution of the tinctura ferri sesquichloridi in the proportion of an ounce to a pint of water.

These and similar enemata will be found applicable to a variety of cases; and in the selection of them, the practitioner must be guided by considerations, as to the age and constitution of the individual, the period of the disorder, and the precise effect which it is intended should be produced. Thus Martinet recommends, that we should employ them in the following series:—1st. An ordinary aperient glyster, with a view of clearing the intestines of faeces. When this has acted, an enema of vinegar and water, or of chloruret of soda, or of common salt, for the purpose of destroying and bringing away the worms; and this, to ensure its full action, should be retained as long as possible; and lastly, an emollient injection is to be given, consisting of olive oil or some mucilaginous decoction, to remove any irritation that may remain.

But enemata of whatever kind will often fail in affording any thing more

than temporary relief, unless at the same time we conjoin them with other modes of treatment. It is generally necessary to keep the upper as well as the lower portion of the alimentary canal clear by the administration of a free purgative, as of calomel and jalap, repeated according to circumstances. " Those purgatives," says Heberden, " are best, which act briskly, and of which a frequent repetition can be most easily borne ; purging waters are of this kind, and jalap, especially for children, two or more grains of which mixed with sugar, are easily taken, and may be repeated daily." Purgatives, which act more particularly on the rectum, as aloes, are often extremely serviceable, and those which bring away the greatest quantity of mucus, and thus deprive the worms of their pabulum, afford the greatest amount of relief. For children the combination of calomel and scammony, in the proportion of one part of the former to three or four of the latter, will be found extremely useful in dislodging the worms ; and the exhibition of such a powder, twice or thrice a week, will be generally followed by a copious discharge of ascarides, if any are present. Cowhage has been found useful in dislodging this species.

Various mechanical means have been devised, for bringing away the worms from the rectum. As, for instance, the plan recommended by Brera, of introducing a piece of lard or a candle into the bowel, which, on being withdrawn, will be found to have a number of the worms adhering to it. Andry and Rosenstein recommended a similar plan, that of tying a piece of lard or fat of pork to a string, and after allowing it to remain in the rectum for a time, withdrawing it full of worms ; or the same object may be often gained by greasing the finger, and then introducing it into the rectum, and bringing away all the worms within reach.

The inordinate itchings, which constitute the most unmanageable part of the treatment, may be often considerably diminished by strict attention to cleanliness and frequent washings with cold water, by keeping the bowels always gently open ; by avoiding all heating articles of food ; and by the application of soothing or oily substances to the rectum, as olive oil, which may be also injected, or when used externally, having a few drops of creosote superadded— an addition which will sometimes afford instantaneous relief when other applications have failed. Rubbing the part, to relieve the itching, almost always aggravates the suffering which it is intended to allay.

Lastly, it must not be forgotten in the treatment of ascarides, that in many cases, these remedies will necessarily afford only partial and temporary relief, unless at the same time, we pay attention to the restoration of the general health, and the establishment of the proper degree of tone of the digestive organs ; and even with every well directed effort to these points, we may not unfrequently meet with cases in which the tendency to the formation of these parasites will not be checked by artificial aids, but will only cease in consequence of the gradual change in the system, attendant on the progressive developement of the body in its passage from childhood to puberty or adult age.

Besides the parasitic worms which have now been described, the human body occasionally becomes the habitation of a variety of other temporary inmates, belonging chiefly to the class of insects. These being deposited in the form of ova upon or within the external outlets of the body, as the ears, nose, mouth, or anus, and there undergoing developement, or creeping in their larva state, cause more or less irritation, and sometimes produce serious symptoms, especially when lodged in the head, where they occasionally occupy the frontal sinuses and posterior nares. The larvæ of insects lodged in this position, have sometimes caused intense headaches, and even convulsions, accompanied by more or less disturbance of the cerebral functions—symptoms which have in some cases endured for years, and have only subsided on the expulsion of the offending body, generally during a violent fit of sneezing. Larvæ occupying the rectum or urinary bladder, cause symptoms of a much lighter character, not differing

indeed from those caused by the entozoa in general, and often not sufficient to attract attention, until the true cause is accidentally discovered.

It would be useless to attempt a classification or even an enumeration of these various fortuitous inmates of the human body, of which numberless examples are recorded in the various medical journals and periodicals. They belong, as has been said, chiefly to the class of insects, and are introduced from without either in the state of ova or of larvæ,—the former generally in the way which we have mentioned; the latter being imbibed with various articles of food, especially fruits and vegetables, or impure water, or inhaled into the nostrils in the act of smelling flowers. They may also possibly creep into the various passages during sleep.

As these often occur singly, and their existence is not suspected until they have been passed, the generality of cases require no sort of medical treatment; but where they give rise to troublesome symptoms, and we have reason to suspect their presence, remedies may be occasionally useful. Thus, insects may be removed from the ears by frequent mild or oily injections; or, if obstinately adherent, may be destroyed first by sulphureous fume, and then washed out. In the case of insects inhabiting the nose or frontal sinuses, injections of oil or infusion of smoke of tobacco have been recommended: and in the most severe cases, permanent relief has been afforded by trephining the frontal sinus and removing the parasite. The use of purgatives and evacuant enemata need hardly be suggested for the removal of larvæ existing in the rectum.

The *external* parasites of man consist of several species of *pediculus* or louse, the *acarus scabiei* or itch insect, and the *pulex penetrans* or chigoe. Of the pediculus or louse there appear to be three, if not four different species, each attaching itself to different parts of the body. Of these the *pediculus capitis* or louse of the head is the most common. There is also the *pediculus pubis* or crab louse, attaching itself to the hair about the pubes and anus, and the *pediculus corporis* or body louse, which appears to differ, in some respects, from the foregoing. And lastly. the *pediculus ciliorum* or louse of the eyelash, which is exceedingly rare, and of which we have met with but two examples, but decidedly differing from the other species. These parasites are always easily removed; either by shaving off the hair to which they are attached, or by the use of mercurial preparations, as the common mercurial ointment, or white precipitate in powder, which prove poisonous to these species, and their removal is then easily effected by washing and attention to cleanliness. The symptoms caused by the *acarus scabiei* or itch insect, and its treatment by the local application of preparations of sulphur, which act as a poison to it, do not here need to be described. The *pulex penetrans* or chigoe, is peculiar to warm climates. It penetrates the skin, and there lodges its eggs to the number of about sixty, which hatch in this position, and often produce serious mischief. The native inhabitants are very skilful at extracting them, which they do with a needle, taking care not to rupture the little cyst or bag in which they are inclosed, an accident which is followed by the discharge of its acrid contents into the wound, and as a result, an ulcerated sore is formed, often very troublesome to heal.

FORMULARY.

PRELIMINARY REMARKS ON THE ART OF PRESCRIBING.*

Difficulty of scientific prescription arising from the extent of knowledge requisite.—Discrimi-
nation as to the cases requiring medical aid.—Medicines divisible into simple and compound,
officinal and extemporaneous or magistral.—Simplicity of prescription.—Elements of a
formula—the principal ingredient—adjuvant or directive—corrective—rival ingredients—
newly developed powers.—Excipient or vehicle, &c. forms of medicines, solid and fluid,
powder, electuary, bolus, linctus, pill, mixture.—Drinks, periods at which they should be
given.—Arrangement of the several ingredients of a formula.—Errors most apt to occur in
extemporaneous prescription.—Domestic measures.—Doses applicable to individual cases,
modified by age, temperament, idiosyncrasy, &c.

THE due selection and adaptation of a remedy to any given case presupposes
an accurate acquaintance with the nature of the disease, at least in its relation to
external agents,—with its actual stage, and with the strength of the patient—with
the influences of age, sex, temperament, and several other individual peculiarities
hereafter to be detailed,—with the effects of climate, season, and prevailing
diathesis in modifying the constitution, both in relation to the morbid actions
going on within it, and also as to its susceptibility to therapeutic agency. A
competent knowledge of " materia medica" and of chemistry, of the average
effects of drugs, and the marks of their genuineness, of their modes of reaction on
each other when combined, and the modification of their effects on the animal
system by such union, is no less indispensable.

When the preliminary acquirements are at once so numerous and so compli-
cated, it is obvious that the business of judicious prescription can never become
a very simple one, nor one in which even a tolerable degree of precision can
rationally be hoped for without much patient study, and ample opportunities for
the acquisition of the necessary knowledge. Presuming our reader to have
enjoyed and already availed himself of such advantages, our present aim will
be confined to fixing his attention on some of the chief objects to be kept in
view, if he would render his prescriptions as efficacious, and as little disagreea-
ble either in their form or consequences as possible.

But before going farther, we would just remind the young pathologist
that there are many disorders, in which nature tends to effect by its own

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* For the materials of this portion of our undertaking we have been largely indebted to the
works of Gaubius, Murray, Paris, Thomson, Edwards, and Vavasseur, Magendie, Lugol, &c.
The methodical treatise of the first named of the above authors, with all its scrupulous minute-
ness and sententiousness, forms the groundwork of nearly all that has been subsequently
attempted in the same department of medical science.

unaided powers so rapid a restoration to health, that his interference should be charingly ventured on, or may sometimes even better be dispensed with altogether—that there are others where he must be content to wait and observe, till such time as the symptoms shall have more fully developed themselves, so as to enable him to decide on a promising line of treatment, comforting himself, in the meantime, with the words of the Roman classic, " Medici plus interdum quiete, quam movendo et agendo proficiunt"—that there are others again whose rash removal would almost certainly be followed by the developement of some worse form of disease—and finally a vast number of others still, in respect to which, as they are in their very nature incurable, his province is restricted to palliation, or sometimes to the yet more humiliating task of merely sustaining the patient's hopes by the exhibition of medicines of little or no real physical efficacy, and thus preventing that abrupt exhaustion of the nervous energy, and premature winding up of the case, to which utter hopelessness would, when the individual is possessed of little strength of character, inevitably give occasion. But the extent to which the practitioner who is actuated by a high sense of honour and rigid veracity, can proceed in this path, is indeed very limited. Hence the great temporary influence which the unprincipled pretender to science is so often enabled to attain over the weak mind of a sinking patient : restrained by no scruples, he is as ready to act vigorously on the brain and nervous system, through the medium of baseless imaginations and unfounded hopes, as on the stomach, the bowels, or the skin, by more substantial agents.

Whatever may be thought, on strictly moral grounds, of holding out, under any circumstances, hopes which are known to be utterly unwarranted, still a broad line of distinction must be drawn between the individual who does so solely with a view to what he considers to be for the best interest of his patient, and the sordid empiric who is influenced by no other motive than a thirst for gain and ephemeral notoriety.

Medicines are usually divided into *simple* and *compound*. All of the former which are in common use in these countries, and some few of the latter, are *officinal*, that is, are to be had from the apothecary's shop on merely specifying their titles. All such being sufficiently described in our Materia Medica or in our Pharmacopœias, in respect both to their preparation, nature, and applications, we mean to concentrate our attention on such additional compound formulæ, as are most likely to form the subject of extemporaneous, or as it is used to be called, magistral prescription. To give examples of every form of medicines which may be called for in practice would obviously be impossible, their variety being as boundless as that of the individual cases to which they are to be accommodated.

In the construction of a compound prescription, the active or leading ingredient is first to be selected, on the principle of its being at once as mild in its nature and dose, and as little disagreeable in its sensible qualities and effects, as may be compatible with the intention of its administration, or, in technical language, with the indications of cure.

The objects which we have in view, in adding other substances to it, are either to determine its mode of action, to exalt its efficacy, to produce some simultaneous but distinct effect, to correct any disagreeable consequences incident to its use, or finally to bestow upon the medicine a more convenient, permanent, or palatable form. In conformity with these intentions every compound formula was analyzed by the older writers into the *basis, adjuvans* vel *dirigens, corrigens* et *constituens*. It must not, however, be concluded from hence, that every well-constructed compound medicine must have so many as four distinct ingredients ; for one of the added substances may often fulfil two or more of the above conditions. Thus, to take a simple example, if an aperient powder be administered in the syrup of ginger, its disagreeable flavour is to a certain degree masked, its irritating or griping quality counteracted or sheathed, and its laxative tendency co-operated with by the medium in which it is exhibited.

So also in the addition of soap to different purgative extracts or powders, their action is at once promoted and rendered more mild, while a proper form or consistency is at the same time given to the mass. In some of our simpler medicines, as for example, manna and cassia fistula, several of the desired conditions already co-exist; and in certain aperient fruits, which combine under a pulpy form aromatic, acidulous, and saccharine qualities, we are furnished by nature with still more remarkable instances of several of the above characteristics happily combined in one substance.

Simplicity of prescription, so far as it is compatible with the objects just alluded to, should never be lost sight of, as it enables us to calculate more accurately on the effects of our treatment, and to discriminate more readily between the results of the medicine and the spontaneously varying features of the disease. Superfluous complication tends not only unnecessarily to oppress the stomach, but further, to create a risk of one part of the heterogeneous mixture neutralizing the effects of another. This was peculiarly the error of the old prescribers, and traces of it are recognisable down to so late a period as the middle of the last century. Many of the ancient prescriptions, as those for *theriacs*, &c., contained some hundreds of ingredients.

OF THE ADJUNCTS TO THE PRINCIPAL INGREDIENT.

1. *The adjuvant.* This may be either similar in nature to the chief ingredient as, firstly, when it is merely another form of the same substance (as, for example, the combination of the tincture, syrup, extract, or powder of a vegetable with its infusion or decoction), the addition being intended to insure the presence of all its active principles, or to present them in such a variety of forms as will enhance the probability of their taking effect; or secondly, when it is a medicine of different name yet of analogous agency; (*ex. gr.*, ipecacuanha or squills introduced in order to reinforce the emetic agency of tartrate of antimony).

We are indebted to Dr. Fordyce for fixing attention on the fact, that when two or more medicines of similar tendency are united, we may often decrease the dose of each considerably below the half of the usual quantity without any diminution in the amount of the required operation; and that at the same time that the proportional effect is thus augmented in a complex ratio, it is moreover very frequently accompanied with less irritation and distress. It is a principle of which the ordinary formula for purgatives and stimulants, afford abundant examples. Even the skilful cook is well aware that it is only from an apt combination of spices that the most agreeable and efficient modification of aromatic flavours can result.

Sometimes the adjuvant seems to exert a *directive influence*, and to determine the organ on which the leading member in the compound shall concentrate its energy. Thus nitre may be to a great degree directed to the kidneys or to the skin, according as it is combined with squill, or with ipecacuanha or guaiacum; calomel has its operation more effectually pointed towards the liver and bowels by the addition of a purgative even in very minute quantity, and so forth.

There are other substances again which appear to exalt the effect of the medicines with which they are united, chiefly by rendering the organs for which the latter already manifest predilection still more susceptible of their influence, and others by merely augmenting the activity of the absorbents. Of one or other of these modes of co-operation we have instances in the effects of the union of mercurials with diuretics, expectorants, and even with some emmenagogues—in the combination of antimonial or acids with saline and other aperients—in the conjunction of powerful stimulants with emetics in cases where the sensibility of the stomach is impaired by narcotic poisons—in the addition of opiates to purgatives in order to affect the bowels in colic from lead and other

causes.   When the tongue is parched and the skin hot and dry, the adminis-
tration of expectorants, diuretics, or diaphoretics, commonly prove nugatory
till fever has been reduced, and the circulation equalized, by the progress of the
disease or some energetic depressing agent, as venesection or antimony ; and even
purgatives, though they can be brought to bear with more certainty on the bowels
than most other medicines on their appropriate organs, are yet often very
materially facilitated in their action by the same auxiliaries ; that the sialagogue
influence of mercurial preparations may be greatly promoted by similar means is
notorious.   It is a law of very general application that inanition, and the gene-
ral reduction of the energy of the circulation consequent upon the use of blood-
letting, purgation, and low diet, are favourable to absorption, and consequently
to the more ready admission of medical and other foreign agents into the
system.

2. *The corrective.*   When the basis is of a nature likely to produce an undue
degree of irritation, so as to run the risk of being rejected by the stomach or
passed off from the bowels prematurely, or to cause an unnecessary or inju-
rious amount of pain or uneasiness, it becomes requisite to subjoin some other
substance or substances capable of counteracting these evils.   Thus for ex-
ample bitter, saline, and other nauseous drugs will often lie easily even on deli-
cate stomachs, on the addition of a small portion of an aromatic powder or
tincture, a dilute mineral acid or other stimulant.   Turpentine is more readily
retained and has its disagreeable flavour in some measure concealed on combi-
nation with red pepper.   The addition of a drop or two of hydrocyanic acid,
or a proportional quantity of laurel water to a mixture, will occasionally subdue
its sickening taste, and the stomach is sometimes very effectually prepared for
tolerating a nauseous medicine by the previous exhibition of a small opiate or a
potion containing two or three drops of the dilute acid just named, or of creosote.
Castor oil may be conciliated with some irritable stomachs by exhibiting it
in emulsion flavoured with syrup of Tolu and compound spirit of lavender, or in
hot coffee, or in union with the compound tincture of senna, or an aromatic
distilled water, or simply by chewing a slice of lemon immediately before and
after it is swallowed.   Trifling as these circumstances may appear, we may
often be indebted to them for being able to avail ourselves of a sickening though
otherwise very valuable medicine.

Certain purgatives are rendered more mild and satisfactory in their operation
by careful trituration with less active ingredients, saccharine pulps, mucilages,
or gritty and absorbent powders.   Even gamboge, after being rubbed up assidu-
ously with an inert and insoluble powder, is less apt to nauseate or gripe, pro-
bably from its facility of solution being somewhat retarded, and the medicine
being thus prevented from expending too much of its power in a concentrated
form on any one part of the mucous membrane : for in respect to the solubility
of drastics there appears to be a happy medium, which, by promoting their
equable distribution over the several successive tracts of the alimentary canal,
diminishes the risk of excessive local irritation.   The addition of spices, and in
some instances of a narcotic, is also a very effectual means of obviating griping
and flatulence, no less than the well-timed administration of diluents and demul-
cent drinks.

The successful exhibition of diuretics and diaphoretics likewise depends in a
great degree on their being adequately guarded by judicious combination, for
when they violently excite the intestinal canal their specific effects on the kid-
neys and skin are apt to be greatly impaired or lost entirely.

The addition of opiates to mercurials, and to preparations of iodine in order
to prevent their producing injurious excitement of the mucous membrane and
running off prematurely by the bowels, is a familiar instance of the same prin-
ciple.   The occasional disagreeable effects of opiates, in their turn, are remark-
ably modified by the addition of vegetable acids and aromatics ; those of colchi-
cum by magnesia, and antimonials, which are prone to act too violently on the

stomach or bowels if acidity be present, by the union of the volatile or one of the fixed alkalies.

3. *Concurrent* or *rival* ingredients, intended to produce simultaneously very dissimilar effects. Such combinations are made where it is desirable immediately to fulfil two or more distinct indications, without, at the same time, burthening the patient with any unnecessary repetition of the disagreeable act of swallowing medicine.

We have examples of this kind in the frequent union of tonics with purgatives, where we wish at once to produce free evacuations, and to sustain the tone of the system at large, and of the stomach and bowels in particular ;—in that of tonics with anthelmintics, where we have the joint object of expelling the parasitic animals already existing, and of so invigorating the digestive organs as to prevent their reproduction ;—in that of antispasmodics with expectorants in asthma, where it is desirable at once to relax spasm, and to procure free secretion :—in that of stimulants and tonics along with diuretics (and especially along with such as are of a very depressing nature), in dropsies occurring in phlegmatic habits, and associated with marked debility ;—in that of opiates with aperients, where it is necessary to keep the bowels open, whilst we are endeavouring to procure sleep or to ease pain ;—in that of diaphoretics with astringents, where we would simultaneously determine to the skin, and control a superabundant mucous secretion from the intestinal canal ;—in that of aperients and antacids along with diffusible stimulants and tonics, in dyspepsia, where acidity and constipation so often coexist with flatulence and debility of the system at large ;—in that of alkalies with vegetable astringents, bitters, and anodynes, in cases where the lithic diathesis is complicated with irritation of the vesical mucous membrane and feeble powers of digestion ;—in that of warm stimulants, as myrrh or some of the terebinthinate class, along with astringents (sulphate of zinc or uva ursi, &c.), in chronic catarrh of the aged. In short it would be quite useless to attempt to enumerate all the instances of this class which are daily occurring in practice ; for under it, in fact, fall nearly all the nicer adaptations of extemporaneous prescriptions to individual cases. It is here too, especially, that the young practitioner incurs the greatest risk of being tempted into a hazardous degree of complexity in his combinations, or of attempting to reconcile inconsistent indications. Embarrassments of this kind may often be avoided by an enlightened diagnosis, and by patiently tracing up the diversified symptoms to a common root, against which almost every effort should be concentrated. Struggling with the several merely functional derangements in detail, to the neglect of their organic source, is something worse than mere trifling. " Nous croyons avoir demontré (says Rostan) que la plus dangereuse des médecines était celle des symptômes."

4. *The union of two ingredients of diverse nature, with a view to the formation of a compound of totally new powers, or to the evolution in an active form of an element which was previously inert.* In the powder of ipecacuanha and opium, though merely an instance of intimate mechanical mixture, we recognise a remarkable alteration of properties, the nauseating tendency of one of the ingredients and the narcotic quality of the other being in a very considerable degree merged in the resulting diaphoretic tendency.

But by far the most striking exemplifications of such transmutation are to be found in the union of substances which react on each other chemically, and thus form a compound possessed of qualities entirely unlike that of either of its constituents, or else evolve in an energetic state one or more of the elements which had previously existed in a neutralized condition. Thus from the combination of vinegar with ammonia there results one of our mildest and most useful diaphoretics. From the action of a salt of iron on the carbonate of an alkali, we obtain this valuable metal in one of its most energetic tonic forms, being that in which it seems most readily taken up by the absorbents, and to exercise the most marked influence on the system, as in the well-known Griffiths's mixture,

in which further, the proto-carbonate is not only suspended, but for a time enabled to maintain itself unaltered in the fluid, by means of the myrrh in its composition. By the addition of lime water to calomel or to corrosive sublimate, we obtain respectively the very useful and comparatively mild preparations so well known in our hospitals by the names of the *black* and the *yellow wash*. On the combination of the citric or tartaric acid with the carbonate of an alkali, a gas is evolved of a nature slightly stimulant to the stomach, giving an agreeable briskness to draughts, and checking nausea; or if the carbonate of magnesia be substituted, we obtain in addition a valuable aperient. So, likewise, on the mixture of yeast in a poultice, the vegetable matter enters into new combinations, and evolves carbonic acid in the form of a useful antiseptic. And to mention one more example, from our comparatively inactive common kitchen salt, there is poured forth, on the addition of the oxide of manganese and sulphuric acid, that energetic corrosive, chlorine gas, which is possessed of such powerful disinfecting qualities.

5. *The excipient or vehicle.* It is often necessary to introduce certain substances of very inferior activity, in order to give an eligible form to a compound. And here two considerations must be kept in view :—1st, what form will give the most efficacy to the active ingredients we are about to administer; and 2dly, in what condition will they prove least repulsive to the individual patient for whom they are intended. When both of these objects can be conciliated, the prescription, supposing its other ingredients to have been judiciously selected in reference to the particular case, may be pronounced complete; but when either must give way to the other, it should obviously be the latter, except perhaps in the case of very young and unmanageable children, or very wayward adults who cannot be prevailed on to swallow any medicine which is at all of a disagreeable form. In the flavouring of medicines of infants we may generally be very liberal in the use of syrups or sugar; but to many grown up people, and perhaps especially to those of an hypochondriac and hysteric tendency, a very sweet taste is often disagreeable, and in place of concealing the unpleasant qualities of a drug, often renders them only more obvious and revolting by the contrast. Acids are, when admissible, much more effectual in reconciling the palate of several kinds of nauseous medicine.

The precise effect of most medicines is modified in a very striking manner by the degree of solubility. This is well seen in regard to some resinous purgatives and aloes, which in their uncombined state, being of very slow solubility, scarcely begin to act till they have reached the lower portion of the intestinal canal, but which have their operation remarkably accelerated on being united with soap or an alkali which enables them to dissolve more readily, and become more equably diffused over the whole length of the mucous membrane; after such addition, they not only procure fuller evacuations, but are less apt to gripe or to give rise to irritation of the lower bowels. The same beneficial results may often be obtained by exhibiting them in fluid mixture, and especially with saline and other aperients of speedy action.

The efficacy of the vegetable tonics and astringents is frequently much promoted by combination with an alkali; and though this is ascribable mainly to the beneficial action of the latter on the mucous membrane, and to its obviating any ascescent tendency which may exist in the primæ viæ, a part of its good effect has been supposed, and reasonably so, to originate in the greater degree of solubility which such additions bestow on their resinous and extractive principles.

It is only by a reference to chemical considerations that we can ascertain what form of a medicine is likely to present in the most energetic form those qualities of a substance of which we would wish chiefly to avail ourselves. Thus water applied in the manner either of cold or warm infusion or decoction is the most appropriate menstruum in relation to some principles; alcohol in a more or less dilute state to others; wine or acids to others; and even syrups or honey,

though generally speaking very feeble solvents, have yet in some few cases a peculiar solubility.   Often it is only by evaporation, and concentration into the form of an extract, that we can obtain the desired substance in its most permanent and active, and yet also its most manageable shape.   And after all there are still many instances in which we cannot make sure of the full effect of a medicine by any one of these processes, and, in order to have the benefit of all its varied powers, are forced to combine the results of all, or else to exhibit it in substance.   In the latter instance, where there is imperfect solubility and considerable hardness, we are commonly obliged to adopt the pulverulent form.

In respect to *powders*, it is often by no means indifferent how far the process of pulverization is carried, as they vary materially in their effects, according to the state of mechanical subdivision to which they are reduced.   The further this is carried in respect to substances whose active principles are not volatile, nor prone to be injuriously acted upon by atmospheric air, the better in general will they fulfil their object.   But there are many others, such as bark, rhubarb, and spices, and those whose aromatic properties are prone to evaporate, or whose extractive matter has a strong affinity for oxygen, which prove more efficient, and retain their virtues longer in a somewhat coarser condition.

Powders may be exhibited either in water or some other convenient fluid, in syrup or mucilage, confection, panada, honey, or sugar, in most instances according to the choice of the patient; but in the case of metallic and other heavy and insoluble powders, the advantage of a thick and viscid vehicle to prevent their subsiding to the bottom of the containing vessel, and thus being in great part lost, is obvious.   Those of an acrid or mechanically irritating nature demand a similar medium.   When insoluble powders of a very different specific gravity from the fluid in which they are exhibited form part of a mixture, the phial should be directed to be carefully shaken before each dose, to prevent the inequality which would otherwise ensue from their sinking in large quantities to the bottom or floating in undue proportion on the top; a precaution equally necessary in the case of the addition of very light or volatile liquids, which have not a strong affinity for the menstruum.   Powders may vary in weight from a grain or two to a drachm to the dose, but should rarely much exceed the latter quantity, as they are otherwise apt, especially if of low specific gravity, to become repulsive or nauseous by their mere bulk.   Where powders of an insoluble nature are exhibited for a considerable period continuously, it is prudent to administer from time to time an aperient to preclude the chance of their accumulation in the intestines.   Even magnesia is not exempt from this risk, and has been known to form dangerous concretions in the colon from the neglect of the above precaution, and from its having been given in quantities too large for the acid present in the stomach and intestines; for when this is sufficiently abundant, the magnesia is dissolved, forms a laxative compound, and so insures its own expulsion.   When powders are made up by the apothecary into a soft paste with conserve of roses, aromatic confection, lenitive electuary, or some vehicle of similar consistence, they constitute the *bolus*, a form of exhibiting medicine particularly disagreeable to some patients from its appearance, as well as from its viscidity causing it to adhere to the teeth and prolong the unpleasant flavour.   In size it may vary from half a drachm to a drachm: the details of its preparation are generally consigned to the apothecary.   The *electuary* is commonly made up in larger quantities, several doses in one vessel, and is of a softer or creamy consistence, its active portion generally consisting of a powder, and in some instances of a terebinthinate or balsam, mixed up with syrup, treacle, honey, or the pulp of fruits, and flavoured or corrected by the addition of the powder of some of the aromatic roots, barks or seeds, or of a small portion of an essential oil.   The dose varies from a half to two or three teaspoonsful.   The *linctus* (looch or eclegma) for lubricating the lining membrane of the mouth and fauces is made generally of a still thinner consistence, or about equal to a syrup in density; and is composed for the most part of sperma-

ceti, or some other oily substance along with mucilage or yolk of egg, syrup, sugar, or honey, to which more active ingredients, sedatives, expectorants, &c., are occasionally added in inconsiderable quantities. Two or three ounces of the compound are usually ordered at a time, of which the patient is directed to take up frequently a small portion on the point of a spoon or of a stick of liquorice, and to allow it to diffuse itself slowly over the mouth and throat. It is a form of medicine now comparatively seldom adopted.

The *pillular* form, much more used than either of the preceding, is peculiarly applicable to such medicines as exist in a very concentrated state, and to those which from considerable specific gravity and difficult solubility are unfit for exhibition in the fluid form, or from their glutinous tenacity are not susceptible of pulverization. It is also very suitable where it is desirable to conceal as much as possible a disagreeable smell or flavour, or to retard the operation of the medicine for some time after it has been swallowed; both of which objects may be still further promoted by involving each pill in a sweetish or inert powder, or in gold or silver leaf, or, as has been ingeniously practised in regard to copaiba, by enclosure in a gelatinous capsule,—a piece of refinement, however, to which it is rarely requisite to have recourse. We must not indeed aim at too far diminishing the solubility of pills : of some of the ill effects so originating we have already spoken ; and may add here that when of too firm a consistence, they have often been known to pass quite through the bowels without ever being dissolved or producing consequently any of the effects for which they were given ; as was frequently the case with the Plummer's pill of a former pharmacopœia. Mucilages, syrups, extracts, and confections are used for binding their ingredients together, where not already of a suitable consistence, and when the mass proves too liquid, this may be readily corrected by the addition of liquorice root, magnesia, flour, or some other inert powder. The addition of a fractional portion of some warm essential oil, or aromatic substance in powder, is generally made to prevent nausea, tormina, and flatulence, as well as to conceal any disagreeable taste or odour. Pills which are made up with treacle are amongst the least apt to become indurated, but there are scarcely any which have not their qualities impaired by very long keeping. The form of pill and of bolus are unsuitable for young children.

The *liquid form* is particularly suited to such medicines as it is desirable should produce a rapid effect, and more especially if they are not of a very disgusting flavour. But to all such rules there will be numerous exceptions : thus in some cases of poisoning (as by the vegetable narcotics for instance) where emetics are necessary, though an instantaneous operation is indispensable, the fluid form is often not the most eligible; and if we are obliged at length to have recourse to it from the failure of emetic powders or boluses and the impossibility of procuring the stomach pump, the quantity of liquid employed should still be small, and of the kind least likely to promote the solution, or favour the absorption of the deleterious substance. If there be any thing within reach which is known to be capable of entering into combination with the poison, and forming an insoluble or comparatively uninjurious compound with it, as is the case with some of those belonging to the mineral kingdom (as common salt with nitrate of silver, Glauber or Epsom salts with the muriate of barytes or with sugar of lead, the tritoxide of iron with arsenic), it should immediately be administered and repeated in every portion of fluid swallowed.

In the preparation of fluid medicines the menstruum should be selected in reference to its power of co-operation favourably with the chief ingredients in the formula, and of correcting, as far as may be, any disagreeable qualities they possess. With such views the infusion or decoction of a vegetable is often made the medium of administering its powder or extract ; camphor mixture or some aromatic water is added if it should have a tendency to sicken

or gripe ; or if very acrid, it is exhibited in almond emulsion or some other
bland fluid.   An effervescent form is, as we have already seen, a very advan-
tageous one for the exhibition of some medicines which are apt immediately
on their being swallowed to derange the stomach or to depress the vital
power; but we must take good care that the ingredients are all compatible
with each other, or such decomposition might otherwise ensue as would alto-
gether frustrate the object of administration.   In this manner colchicum, tar-
tarized soda, opiates, and some other substances, are often given.

The disgusting flavour of the carbonate of magnesia, whether solid or in
solution, is in a great measure subdued by exhibiting it in an effervescent state
along with lemon juice or an acidulated syrup, taking care however that the
acid shall be in minor proportion in cases where we wish to obtain the benefit
of the antacid no less than of the aperient virtues of the medicine.

Where *dilution* is requisite during the operation of a medicine it is by no
means indifferent at what period it is resorted to.   Thus, supposing it is our
aim to produce a diuretic effect, and that the medicine selected for the purpose
should also be possessed of diaphoretic or cathartic qualities, drinks should be
withheld for an hour or two after its exhibition to allow time for its being
absorbed and carried to the kidneys ; for if the patient be prematurely deluged
with liquids, the diuretic principle would probably be hurried off by the bowels ;
or, supposing the body to be kept very warm by an injudicious accumulation of
coverings, the medicine would in all likelihood expend its whole energy on the
cutaneous exhalants, and so our original object be totally frustrated.   Thus
again, after the swallowing of a medicine which contains nauseating ingredients
(as, for example, Dover's powder), and which it is desirable to have absorbed,
or at least to have retained long enough to allow of its producing its peculiar
effects on the skin, we should beware of immediately over-distending the
stomach with tepid drinks, which, however useful auxiliaries an hour or so
later, are, if given at this period, very apt to produce an emetic effect.   It is
not however our object to enter here at length into the subject of the drinks
of the sick, and we would merely remark before quitting it, that those of an
acid quality, as well as all fruits and other substances of an ascescent tendency,
should be avoided during the exhibition of calomel and such other medicines as
have a tendency to produce irritation of the mucous membrane—a state in
which mucilaginous diluents, such as rice water, thin arrow root, or barley
water, infusion of linseed, or decoction of marsh mallows, or solutions of gum
or of isinglass, taken frequently and in small quantities at a time, are the most
appropriate drinks : and so likewise where irritation of the urinary organs
exists ;—that to promote diaphoresis, the thinnest diluents, such as whey or tea,
drank very hot, are the most suitable ;—to favour the action of the kidneys in
dropsy, imperial (a solution of cream of tartar flavoured with lemon and sugar),
a decoction of broom tops, or an infusion of juniper berries, may be used freely,
as they often lend effective aid to more powerful diuretics ;—and finally when
we would facilitate the operation of emetics, tepid fluids, such as the infusion of
chamomile, or water having a little flour of mustard diffused through it or even
tepid water alone, drank in large quantities and at short intervals, are by the
distension and nausea which they cause, very important auxiliaries.

The order in which the several ingredients in a prescription should stand i
generally determined by a joint consideration of the relative importance of their
operation, of the similarity of their nature, and of the succession in which their
combination may be most scientifically effected.   Thus the vehicle or men-
struum should commonly be placed next after the substance in reference to
which it is specially chosen.   Substances which would be injured by heat should
be postponed to those requiring infusion or decoction, and this is especially the
case with regard to volatile and aromatic ingredients (ammonia, tinctures,
ethers, terebinthinates, and spices, &c.), of which the active principles would
be in great part, if not entirely, dissipated long before the other more fixed

ingredients were ready for use. The mineral acids should, for the most part, be added to the menstruum, as their immediate contact with the other substances in an inadequately diluted form would often lead to the destruction of the very qualities for which the latter were selected ; in some instances however they are intended to be applied in a somewhat strong condition in order to facilitate the solution of obdurate materials.

OF THE ERRORS MOST APT TO OCCUR IN EXTEMPORANEOUS PRESCRIPTION.

These are referrible to the following heads :—

1. *Ordering substances to be combined, which are by their nature incapable of uniting,* as oleaginous, balsamic, or resinous substances in an infusion, decoction, or lotion, without any common bond of union, as mucilage, yolk of egg, and alkali, &c. ; or calomel or other heavy and insoluble powder in an aqueous medium, &c.

2. *Prescribing a particular form for the compound which its ingredients, when brought in contact, are incapable of assuming or preserving*—as the pillular, when the ingredients have too little cohesion or solidity (here the additions alluded to in a former paragraph will often do away with the difficulty) ;—ordering a powder where the substances, though themselves perhaps pulverulent, melt on being intimately mixed, as is the case with Glauber salt on being triturated along with carbonate of potass, crystallized alum with sugar of lead, or myrrh with a crystalline alkaline salt, and other such instances where the water of crystallization is set free in sufficient quantity for the solution, or at least for the moistening of the new compound.

3. *Directing a dose of greater bulk than can conveniently be taken at one time ;* thus ordering pills of a size difficult of deglutition, powders of an irritating nature without pointing out the necessity of enveloping them before they are swallowed in some sheathing medium, or taking after them an appropriate diluent or mucilaginous drink, or protecting the stomach from their concentrated action by premising a light meal, as is so requisite in the case of arsenical and some corrosive metallic preparations, tincture of cantharides, &c.

4. *Ignorantly ordering substances to be combined which react on each other, so as to produce new compounds of qualities totally dissimilar from those of which the prescriber had intended to avail himself,* as for instance the union of the diacetate of lead with the sulphate of alumine, or with the compound infusion of roses or the sulphate of magnesia, when he wishes for a powerful styptic medicine ; the combination of alcoholic tinctures, ethers, or acids, in large proportion along with mucilages and emulsions ; lime water, alkaline carbonates, bitter and astringent vegetable infusions or decoctions along with metallic salts, as the sulphate of iron, nitrate of silver, &c., of the astringency of which he wishes to have the benefit ; Goulard in large quantity in mucilaginous lotions, or astringents with isinglass, &c. But it would be endless to attempt to enumerate all the errors of this kind, to which an ignorance of chemical affinities may give rise : for such farther details on the subject as may be very commonly required for the direction of the prescribers of medical substances we must refer our readers to such tables of incompatibles as that affixed to the last edition of Dr. Thomson's *Materia Medica*, and before leaving the subject, merely recall to their memory the law, of very extensive application, announced long since by a distinguished French chemist, namely, that if solutions of two salts containing elements within them capable of forming a soluble and an insoluble salt, be brought together, a decomposition must necessarily take place ; as, for example, when the nitrate of silver and common salt are mixed, the result being the precipitation of the muriate of silver, whilst the nitrate of soda remains in solution. Still however it must be confessed,

there are many instances of medicines of an apparently very unchemical nature doing good service in the treatment of disease, and here of course the dictates of theory must yield to those of experience. Such exceptions at the same time can never warrant the young practitioner in blindly ordering combinations which are at once unscientific and untried.

5. *Directing a mode of preparing the ingredients which is injurious to their qualities or unsuited for the developement of their full powers.* Thus, as we have already seen, some vegetable matters which are very efficient when given in substance or even in the form of cold infusion, may lose nearly all their virtues by long-continued coction, which evaporates their essential oil, and oxidizes and precipitates their extractive matter often in an inert form. To take a familiar example of the injurious influence of protracted exposure to heat, the leaf of the cherry laurel, which is used in our kitchens to impart an elegant flavour to various preparations of milk, has its peculiar properties entirely dissipated if long boiled. Some vegetable preparations are rendered on the other hand more irritating by much boiling, as senna, which has its griping tendency thus much increased.

An opposite error to that just alluded to is the ordering the form of infusion, instead of that of decoction, for a vegetable whose mucilaginous or astringent qualities we would obtain, in the largest proportion, in solution. Another is the selection of an inappropriate menstruum, as an aqueous one for vegetables whose resinous or balsamic qualities we would fully extract, or an alcoholic one for the solution of gummy matter or isinglass. With the gum resins indeed a kind of emulsion is formed with water by means of trituration, but even here a deposition speedily begins to take place, indicating the necessity of their being freshly prepared for use.

6. *Omitting the proper directions for the preparation or use of a medicine.* An oversight may also be committed in respect to not directing the precise part of a plant which we wish to subject to preparation, in case that it be one foreign to our pharmacopœias,—or whether it should be bruised or otherwise comminuted before being exposed to the action of the proper menstruum—the omitting to mention how long maceration should be continued—whether straining is requisite, and similar details. It is true the apothecary, supposing him a well instructed one, may be capable of supplying all these oversights, but it is not less the duty of the prescriber, in uncertainty as to what hands his formula may fall into, to define such points with sufficient minuteness and accuracy. The time of day at which the medicine should be taken, as well as the intervals of the dose where repetition is requisite, and the quantity, should not be omitted. Nor should it be forgotton that the nature of the menstruum, quite independent of the strength of the active ingredients, must often limit the extent of the dose. Thus the quantity of a tincture should rarely exceed a drachm or two at a time. When it holds a narcotic or acrid substance in solution, as opium or cantharides, the dose will of course be very much less than this. The stimulant character of such a vehicle renders its habitual use in many chronic cases objectionable, even in a tolerably dilute state, and in acute disease often altogether inadmissible, especially in the case of children and others unhabituated to vinous fluids. The advantages attendant on their addition in some cases to infusions and decoctions, in causing them to agree better with delicate stomachs and to keep somewhat longer unimpaired, have already been alluded to—circumstances which, together with the fact of certain principles being soluble in them only, and the comparative permanence of their composition in different climates and seasons, must ever give them a high value when judiciously used. At the same time it must be confessed that their habitual misuse, and that too even under medical sanction, has in too many instances laid the foundation for lamentable intemperance. Tinctures made with alcohol in a concentrated form are liable to deposit a portion of

their ingredients on the addition of water—an inconvenience from which those in whose preparation a weaker spirit (as proof spirit) is employed, are free.

The quantity of an infusion or decoction ordered at one time should, in consequence of their liability to spoil, rarely exceed from six to eight ounces, except in the case of those of which the dose is unusually large, as, for example, the decoction of sarsaparilla. The quantity ordinarily prescribed at each dose (with the exception of such as contain an acrid or narcotic principle, as digitalis, . dulcamara, or Geoffroya for instance), varies from one to two or three ounces. When too much is taken at one time they are apt to oppress the stomach, an inconvenience which is to be avoided by diminishing the dose and increasing the frequency of its repetition. Three, four, or six hours are very common intervals ; but these of course vary with the nature of the medicine and of the precise effect we would obtain from its use. As a general rule, infusions are less disagreeable, and sit lighter on the stomach than decoctions, as the former retain more of any essential oil which may happen to enter into the composition of the vegetable matter employed,—and the lower the temperature employed, the more truly does this hold,—but, on the other hand, they are in many instances feebler in their action.

Whether the form of mixture or draught should be selected for a medicine, depends much on whether very great accuracy in the dose is important. When . the ingredients of a mixture are in kind and quantity sufficient to produce a poisonous effect, the subdivision into separate phials, each containing a single draught, is at least a prudent precaution. It is more especially necessary where any of the ingredients are either of a very heavy or very light nature, as, from inadvertence in respect to forgetting to shake a larger bottle, the distribution of the doses might be very unequal. Such subdivision is also advantageous in the case of very volatile medicines, which are apt to be in a great degree dissipated on very frequent removal of the cork. But the degree of prudence and attention which the attendants display, and the relative importance of economy in small matters to the patient (especially when the subject of a protracted malady), will of course, in some degree, influence us in respect to this and many similar minor points.

In neat prescription, the several items are generally so proportioned, as that, when all are added together, they shall form an even weight or measure. This at once aids the memory in retaining the proportions, and in the case of a draught or mixture adapts it for filling one of the ordinary-sized bottles, these being made according to a fixed gradation of sizes—1, 2, 4, 6, 8, 12, ounces, &c. Strict adhesion to this point is, however, obviously of very secondary consequence, and is very often dispensed with. Again, it is very convenient that where several doses are ordered together, the active ingredient in each dose should be a submultiple of the whole quantity of it,—or, in other words, that the latter should divide without a fraction. Thus we always know precisely, and easily retain in memory, the exact portion taken at a time ; for example, if we wish to exhibit calomel in divided doses, it will be more natural and suitable to direct twelve grains to be apportioned into four powders, than ten into three, though the actual difference in the strength of each dose is so trivial. This, to be sure, is a simple matter, but every tyro is not fully aware how much attention to such trifles facilitates practice.

In composing a prescription, it is best for the beginner to commence by determining the quantity of each of the more active ingredients for a single dose ; then that of the adjuncts corrective and recipient ; and finally, multiply each separately (or, if he please, leave it to the compounder to do so), according to the number of doses, pills, powders, or draughts he wishes to have made up at once. Thus errors will be less likely to arise, than where the larger quantity is first fixed upon, and its subdivision subsequently performed, as usually practised by the more experienced prescriber.

In popular recipes great incorrectness of quantity is liable to arise in conse-

quence of the troy, or apothecaries' drachm being so very much heavier than —above double—the drachm avoirdupois ; and consequently the apothecaries' ounce also, though it contains just half as many drachms as the ounce avoirdupois, is heavier than it.* Whereas the troy pound on the contrary is the lighter of the two,† there being four ounces less in it. The confusion and inexactness to which all this may give rise in ignorant hands is obvious. Even careless apothecaries, who sometimes use troy weight for nothing above a couple of drachms, are liable, from the same cause, to commit great errors, and the more especially so as the druggist sells every thing to them by avoirdupois weight.

Powders should rarely be ordered in large quantities at once, as many of them, as, for example, bark, rhubarb, guaiacum, &c., are materially injured by the action of the atmosphere and light ; there are in fact but very few medicines which, like mercurial ointment, can be said to improve by keeping. The dose of most of the powders ordered in our pharmacopœias, vary from five to ten grains. Even in respect to *bulk* alone, a powder, especially of any light vegetable matter, becomes inconvenient where it much exceeds a drachm. Cinchona is one of the few which it may sometimes be requisite to take in larger doses ; though the occasion for this has been of late years almost entirely done away with, by the discovery of quinine. Many of our most active remedies, especially the alkaloids of recent introduction into practice, exist in the pulverulent form, and are not included in the above remarks, their dose being, for the most part, only the fractional part of a grain.

The following table of the *average* quantities of different forms of medicine, and of certain of their adjuncts usually directed, may prove of some assistance in the art of prescribing.

DRAUGHT—from one ounce to two or three ounces.

PILL—three to five grains. (Narcotic pills are often left much smaller than this, even after the addition, occasionally made to the active ingredients, of some comparatively inert powder or extract to augment its bulk.)

POWDER—five grains to a drachm. (Calomel and some other active powders are often made up into powders of much smaller bulk than even the first of these quantities.)

BOLUS—a scruple to a drachm.

ELECTUARY—each dose from half a drachm to two drachms. (The whole quantity ordered at a time from two to four ounces.)

TINCTURE—the quantity usually added to infusions, decoctions, &c. to qualify them, varies from half a drachm to a drachm and a half to each fluid ounce.

SUGAR—half a scruple to a scruple to every ounce of a mixture or draught when it is requisite to sweeten them.

SYRUP—simple—half a drachm to a drachm and a half to each ounce of a mixture or draught. The latter quantity would render them too sweet for many palates. To conceal the flavour of children's medicine, a still larger proportion is sometimes added. Of syrups containing active ingredients in solution, the ordinary dose is from one to two or three drachms.

HONEY—two parts to one of turpentine, &c., to form an electuary. Dry powders will require a larger proportion ; a simple or compound syrup or treacle may be substituted, thickened if necessary with powdered liquorice and a portion of compound powder of cinnamon.

GUM-ACACIA IN POWDER—two drachms to suspend an ounce of oil, or a drachm and a half of the resin of guaiacum, &c., in water in the form of emulsion ; half a drachm to each ounce of fluid for a cough mixture ; from half an ounce

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* Somewhere about one-tenth. For their precise relative values, see the very useful tables in the late Dr. Duncan's Dispensatory.

† By somewhat more than one-sixth.

to an ounce for each quart of water for a mucilaginous drink, to be taken *ad libitum* in irritation of the stomach, bowels, and urinary organs.

MUCILAGE OF ACACIA—one to two drachms to each ounce of fluid for a cough mixture, &c. Six drachms to an ounce of olive or other fixed oil to form an emulsion with water; or to suspend a drachm and a half of resin of guaiacum or of balsam of copaiba along with a couple of drachms of sugar in an eight-ounce mixture. The yolk of one egg is a good substitute.

TRAGACANTHÆ GUM—four or five grains render an ounce of water mucilaginous.

SOAP—a bitter extract, or a confection—about one part to two or three parts of most powders to form a mass for pills.

POWDERS (cinchona, &c.)—from a scruple to half a drachm to each ounce of a mixture.

AROMATIC POWDERS—five to fifteen grains added as a corrective to other powders, bolus, or draught.

AROMATIC CONFECTION—one to two scruples to a bolus or to a draught of two ounces, and proportionably to a mixture.

ESSENTIAL OILS—♏$\frac{1}{6}$ to ♏$\frac{1}{3}$ to a pill; ♏ii.—vi. (to be dropped on sugar ℥i.—ii. and rubbed up gradually with water) for a draught, or imitation of the distilled water of the same name.

DOMESTIC MEASURES.

Medicines are often directed to be taken by the full of a *cup*, *glass*, or *spoon*. The quantities so indicated are too vague to be suited for the dosing of active remedies.

A *teacupful* is generally supposed to be equivalent to four ounces of an aqueous fluid.

A *wineglassful* is generally supposed to be equivalent to an ounce and a half.

A *tablespoonful* is generally supposed to be equivalent to half an ounce.

A *dessert spoonful* is generally supposed to be equivalent to two drachms.

A *teaspoonful* is generally supposed to be equivalent to one drachm of water; but of course to a considerable smaller weight of ether, or of an alcoholic tincture and other fluids of a specific gravity much inferior to that of water; and the reverse in respect to nitric and sulphuric acids and other fluids of higher specific gravities.

A teaspoonful of a heavyish powder contains about half a drachm, as sulphur for example.

A teaspoonful of a very light powder (as magnesia), about ten grains.

But to show still further how very indefinite such methods of measurement are, we may mention that we have found an evening teacup, of the medium size, when full up to the brim, to contain six ounces; or when of the ordinary degree of fulness, so as to be easily handed without risk of spilling, about four and a half ounces or five ounces.

A *breakfast teacup*, when filled quite to the brim, contains above twelve ounces; when filled to within half an inch of the brim only eight ounces.

A *coffee cup*, when filled to the brim contains about five ounces; when of the ordinary degree of fulness, about four ounces.

A *wineglass*, when filled to the brim, contains about three ounces; or when of the ordinary degree of fulness, about two ounces.

In French clinical reports, "*un verre*" represents about four ounces.

A *drop*, a *minim*, and a *grain weight* of a fluid are, when great exactness is not required, generally considered as equivalents. Measuring by the *minim* or sixtieth part of a fluid drachm, as now very commonly adopted, has a great advantage in respect to equability over the old method by drops, these varying in

size, not only with differences in the lip of the vessel and mode of dropping, but also with the nature of the fluid.

The *manipulus* of the older writers stood for half an ounce, being a handful; the *pugillus*, for a quantity which could be taken up by the thumb and two first fingers, or about a drachm, or the fourth of the manipulus.

ON DOSES AS APPLICABLE TO INDIVIDUAL CASES.

The determination of the dose depends on a great number of joint considerations—the precise object we have in view in its administration—the frequency of its repetition—the age, sex, temperament, idiosyncrasy, and habits of the patient—the period of the disease and state of the general strength—the condition of the stomach and intestines in particular, and in some cases also that of the heart, brain, and urinary organs, as well as of the uterus—the influence of climate, season, and prevailing diathesis—and finally the chances of varying strength in the medicine.

The object in view in the administration of the medicine. Difference of dose often materially modifies not only the degree, but often the very nature of the effect produced by a given medicine. Thus, for example, *camphor* which in small doses is stimulant and antispasmodic, in large ones is apt to be emetic, or, if retained in the stomach, may prove alarmingly narcotic. All this holds good in a minor degree of *nutmeg* also. *Opium*, which when given in small quantities and frequently repeated has generally, and especially in debilitated states of body, an exciting action in a very marked degree, proves in full doses most powerfully narcotic. The *neutral salts*, which in moderate doses are amongst our commonest aperients, in very large ones are emetic, and in small ones act for the most part on the kidneys. *Turpentine*, when administered in small doses, as from a scruple to a drachm, is apt to excite urinary irritation; yet in full doses, as from half an ounce to an ounce, especially if combined with castor oil, or olive oil, it passes off freely by the bowels, without producing, for the most part, any such disagreeable effect. *Antimonials*, which in fractional doses act on the skin and facilitate expectoration, in large ones vomit, and purge, and reduce in a remarkable degree the strength and frequency of the pulse, and the vital energy generally. *Ipecacuanha* varies in its effect in relation to the dose in a very similar manner, save that it does not produce such formidable depression; whilst in small quantities it has in addition even a tonic and stomachic effect, as in dyspeptic cases, and is equivalent to an astringent in dysenteric ones.

Calomel in large insulated doses has a powerfully purgative and probilious effect; in smaller and frequently repeated ones it salivates and acts on the system at large. Such, at least, is the general difference of result in relation to its doses, though exceptions do not unfrequently occur, a large single dose sometimes affecting the constitution, whilst small and reiterated ones are apt at length to act powerfully on the bowels. *Tobacco* in minute doses is diuretic, whilst in somewhat larger ones it has a deadly sickening and narcotic influence, depressing with fearful rapidity the powers of life. And to give one more instance:—*Rhubarb*, which in the quantity of from a scruple to half a drachm is such an effectual purgative for an adult, in doses of four or five grains displays invaluable stomachic properties. From all this the absurdity of the vulgar is obvious, who when pleased with the effects of a medicine think to augment its utility in proportion as they swallow it in larger quantities. Large doses of most active substances produce so great a degree of local irritation, as either to cause their speedy expulsion from the stomach and bowels, or, at least, to diminish materially the chances of their being taken into the system or of permanently modifying the action of the parts with which they come in contact. A repetition of small doses at short intervals affords,

generally speaking, the best chance of absorption. Even where the augment-ation of an evacuation, or its reproduction when altogether suppressed, is our object, the doses of the appropriate medicine should be moderate, and espe-cially so in very chronic diseases, as otherwise they exhaust for a considerable period the excitability of the organs on which their influence is directed, and are often followed by a still greater deficiency of secerning energy, and produce in the system at large an alternation of irritation and exhaustion very un-favourable to the re-establishment of healthy actions.

Age. Persons of adult age and in the vigour of life generally require the largest doses. For the old, some diminution ought commonly to be made. In infancy, childhood, and youth, the dose is somewhat but not exactly, in the ratio of the age. Thus according to the approximate table, constructed by Gaubius on the basis of experience, supposing the dose of a given medicine proper for a healthy adult to be one drachm,

That for a patient of 20 years old will be about Əij. or two-thirds,

—	—	14	—	—	Ʒss.—one-half,
—	—	7	—	—	Əj.—one-third,
—	—	4	—	—	gr. xv.—one-fourth,
—	—	3	—	—	gr. x.—one-sixth,
—	—	2	—	—	gr. viii.—one-eighth,
—	—	1	—	—	gr. v.—one-twelfth;

or according to the formula of Dr. Young, which is more easily retained in the memory than the above table, and comes sufficiently close to it in its re-sults for all practical purposes, "the doses of most medicines for children under twelve years of age, must be diminished in the proportion of the age to the age increased by 12: thus, for example, at two years, $\dfrac{2}{2+12} = \dfrac{1}{7}$."

But to all such generalizations, it must be recollected there are some re-markable exceptions. Thus even very young children bear *purgatives*, and especially *calomel* in larger proportioned doses than adults; but though the immediate irritation produced by them in infancy is less conspicuous than at a more advanced period of life, it would be a grievous error to suppose that their frequent administration, and particularly that of the latter, can fail of being highly injurious and debilitating in the long run at any age. Mercury, however, it must be admitted is attended with little comparative risk of pro-ducing salivation in very early life some practitioners of extensive experience have even declared that they never met with such an occurrence within the third year; but we have reason to believe that the exemption is not absolute.

With regard to *narcotics* on the other hand, it would be in the highest degree imprudent to venture on giving them to infants in any thing like such propor-tional doses as the above table would indicate. Children in the early months have been poisoned by a single drop of laudanum. Still when the use of such a remedy is clearly indicated, it may be ventured on with safety in prudent hands, even from the very earliest periods. Thus a drop of the tincture may be made up into an ounce mixture, and a tea-spoonful be given at a time, and its effects carefully watched for two or three hours before venturing on a repetition of the dose; after the third month, half a drop may generally be ventured on at each dose, and after the sixth month a whole drop. These proportions are obviously only approximate, and must be modified in relation to the strength of the infant and the nature and period of the disease under which it labours. Where incessant purging and vomiting, or extreme spasmodic pain are present, the risk of its injurious effects are, *cæteris paribus*, the least. Stimulants of all kinds should, as a general rule, be administered to children with a sparing hand; there are however cases of extreme exhaustion and collapse, when their sea-

sonable employment effects wonders.   Blisters should not be kept on very young children above two or three hours, as frequently from the neglect of this precaution ill-conditioned sores of a gangrenous tendency have resulted ; nor is very large sanguineous depletion, though recourse to it may be clearly requisite, quite so well tolerated at this as at a later age, the growth of the body at this period making incessant demands on the activity of the circulatory system.

Sex.   Women, as having a more delicate frame, and greater nervous susceptibility, require for the most part weaker doses than men.

Temperament has likewise a most material influence, in respect to the relative effects of medical agents.   The phlegmatic, melancholic, and athletic, or those with a fully developed muscular system, generally require a larger quantity of a given medicine, than the nervous or sanguineo-nervous temperament, in order to produce an equal amount of operation.   The phlegmatic and nervous coincide, however, in respect to commonly bearing large depletion by the lancet badly.   To persons of a strumous feeble habit, a long-continued depressing treatment is peculiarly inimical, great reduction of diet, large losses of blood, and the free exhibition of mercury being notoriously injurious to such individuals, and only to be ventured on in cases of great urgency, and when the risk from the disease fairly outweighs that from the proposed treatment.   It is in such habits as those last named, that the tonic system effects its greatest triumphs when judiciously applied and followed up perseveringly.

Idiosyncrasy.   Individual peculiarities in respect to susceptibility to external agencies, though it be generally altogether impossible to give any rational explanation of their source, or even, from any external signs, to anticipate their existence, should invariably be inquired after, and respected by the prescriber. Such are amongst the cases in which the regular attendant has a decided advantage over a stranger.   " Cum par scientia est, utiliorem tamen medicum esse amicum quam extraneum."

Gaubius speaks of a patient of his who was affected by so simple a substance as the " lapilli cancrorum," (little different from common chalk,) with symptoms almost as virulent as arsenic could have produced.   Cullen knew a person who would faint at the smell of mutton, and another in whom convulsions were brought on by eating a morsel of egg.   Certain shellfish produce an almost immediate eruption in some habits ; nuts in others.   The dangerous effects produced by some varieties of mushroom are well known ; but even the edible species are very injurious to particular individuals.   We have known such persons have an attack of cholera brought on by eating hashes, into the composition of which ketchup entered, and one instance of a whole family suffering simultaneously from a sudden cutaneous eruption, from the same cause.   Even tea and coffee, which agree so well with most people, in some instances, from their peculiar action on the nervous system and on the circulation, resemble poisons ; and honey, which so many use as a regular article of diet, produces in others, even in very small quantities, severe gastro-intestinal irritation.   We know an individual who, as often as he eats a few strawberries (generally speaking, one of the wholesomest of fruits), is immediately affected with a sense of prickling over the tongue ; if he persists, this nervous irritation extends to the face and even to the upper part of the chest ; another very strong man, in whom the use of the simplest of our garden fruits is followed soon after by an eruption of nettle-rash.   The irritation of a blister, or even of leeches, will give rise to extensive erysipelas in some habits.   The very smell of a purgative, says Gaubius, will affect the bowels of some, whilst others cannot be moved by any thing under a double dose.   The difference in regard to pain or uneasiness produced by the same purgative in different individuals is also very remarkable ; even the simplest, as senna or manna, cause intolerable griping in some people.   The susceptibility to the influence of mercury likewise varies in a very remarkable degree.   We have seen a person salivated severely by four or five grains of blue pill taken in divided doses, in the course of two or three

days, along with other medicines of an aperient nature, but which had failed to operate on the bowels. The facility of salivation was, in this case, hereditary. Mercury, in any form, excites in some individuals, and more particularly in those in whom salivation is not easily produced, a frightful degree of erethism, with most alarming depression of the vital powers. We have seen a complete, but temporary loss of sight, accompanied by various evidences of undue determination of blood to the head, supervene upon the occurrence of a violent salivation induced by the application of camphorated mercurial ointment for a few days to an enlarged testis. The effects of opium are so very distressing to certain patients as almost to preclude its use in the treatment of their diseases. Excessive itching and an eruption terminating in desquamation have been noticed amongst its occasional annoyances. But the examples of this kind are quite endless. Suffice it to say, that there is scarcely any article of food or medicine, however simple, which has not been known to prove peculiarly disagreeable or repulsive to some individual or other. The prudent practitioner may often save much unnecessary annoyance to all parties by making himself acquainted with his patient's previous experience on this head.

An accurate investigation into our patient's *habits* in respect to regimen and medicine is also of the first importance. Those who have been long addicted to intemperance generally bear depletions ill. Even the sudden abstraction of his accustomed stimulants from the habitual drunkard, without giving him any appropriate medicinal substitute, is a frequent source of delirium tremens, and even of fatal exhaustion. The ill effects of such sudden and total change in the habits have been also manifested, in a minor degree, in the retardation of recoveries after accidents, or severe surgical operations. The instant withdrawal of opium from those who have long been in the habit of using it, or even the too rapid reduction of the dose, has appeared to us decidedly to shorten existence in incurable chronic disease. Most medicines, and especially narcotics, have their operation diminished by habitual use, as is daily observable in those who have addicted themselves to tobacco or to opiates. Hence this class of substances must be gradually augmented in dose, or else one kind of narcotic must be frequently substituted for another, if we would keep up an average amount of effect. To the general law of habit diminishing the influence of medicinal agents there are, however, some exceptions. Thus, for example, the saline aperients when taken in a very dilute form, and in the peculiar combinations in which they are presented in some natural mineral waters, appear to increase in influence according as they are continued ; of which we have had personal conviction in respect to the thermal saline waters of Carlsbad, and the bitter water of Pullna in Bohemia ; and the same holds good, though in a minor degree, in respect to the waters of Harrowgate, Cheltenham, Leamington, &c. Once that their influence over the secretions of the mucous membrane is established the daily repetition of the same, or sometimes of even a smaller dose, will sustain a similar amount of operation during many weeks ; and often even after their use has been discontinued, there remains the well-formed habit of regular evacuation. There are, again, certain medicines which have a tendency to accumulate in the system, and to which repeated use seems to have no tendency to reconcile it ; such, for instance, as mercury, lead, arsenic, iodine, and digitalis.

The *period* and *intensity of the disease* we have to treat, and the *degree of strength* remaining to the patient, obviously form most important data in the regulation of the proper doses. The same medicine which in the commencement of an acute affection might have exercised a most beneficial influence over its progress, may, if administered after debility or a tendency to collapse have manifested themselves, prove quickly fatal : whereas it is exactly at this period that another class of medicines, those of a stimulant nature, may be given with a most liberal hand, it being understood that their use shall always be commenced

experimentally, that is, in small and dilute quantities, the effects of which are to be carefully watched.

With regard to evacuants, the danger of their free use in the advanced period of many acute and chronic disorders is now pretty generally understood; but with respect to anodynes and narcotics, we are not quite sure that the risk of *large* doses at a similar stage of illness, and when weakness and exhaustion have fully set in, is so universally known as to allow us to omit cautioning our younger brethren on the subject, even in relation to such patients as have, when in a stronger condition, habituated themselves to the use of this class of substances.

The state of the stomach and intestines will necessarily influence us much, both in respect to the quantity as well as of the quality of medicine to be employed. When these organs are in a state of irritation, the exhibition of such a dose, as will in all probability either be rejected or increase the existing excitement, is worse than trifling. In this condition of the digestive organs certain medicines seem altogether to lose their specific effects. Digitalis, for example, no longer displays its powers of reducing the circulation, nor of augmenting the urinary secretion. Bark ceases to control ague, mercury to restrain syphilitic action, &c. In such cases an appropriate preparatory treatment and the simultaneous exhibition of judiciously selected corrigents are peculiarly called for. Again, when the secretions of the chylopoietic viscera are disordered, the administration of tonics and alteratives will generally prove totally inefficient till these have been first set right.

The condition of the *circulatory system* is another element never to be neglected in the determination of doses. To exhibit a nauseous medicine in such a quantity as might perchance induce violent vomiting or extreme depression, would expose the patient labouring under particular states of disease of the heart or great vessels, to the peril of instantaneous death. When the *air passages* and *lungs* are extensively inflamed, and on the eve of relieving themselves by a copious secretion, the injurious effects of opiates is notorious. The state of the *brain*, likewise, and even that of the *skin*, are not to be lost sight of. To exhibit an antimonial or any other violent emetic to an apoplectic sufferer, or large doses of bark, opium, or other heating or stimulating medicine to a patient in whom a hot and dry skin and constipated bowels coexisted with marked symptoms of morbid determination to the brain, might be to seal his fate. In mental derangement on the other hand, somewhat larger doses than ordinary of certain medicines, of the evacuant class especially, become necessary, and this is still more pointedly the case in respect to those who labour under cerebral oppression. The exhibition of stimulants will generally "cæteris paribus" prove more injurious to those already exposed to sources of sensorial excitement, as for instance to the student and the anxious and confined man of business, than to those of more active and out-of-door habits.

The recognition of certain morbid states of the *urinary organs* may also limit us in the use of particular remedies, such as cantharides in any of its forms, external or internal, turpentine in small doses, &c. Of the importance of a knowledge of the actual condition of the *uterine system* towards successful or even safe prescriptions for females, both the public and the profession are sufficiently aware. The propriety of abstaining during the menstrual period from all violent doses, especially those of a drastic and exciting nature, as well as from all abstraction of blood which is not imperatively called for by the urgency of severe disease, is very generally agreed upon. During pregnancy likewise the mildest medicines, and in moderate doses, are alone eligible, and the exhibition of mercury with a view to affect the system, of digitalis and of rough and depressing emetics and other medicines of great energy, should, unless under very pressing circumstances, be postponed.

The influence which *climate* and *season* should exercise in the modification of our doses is also generally acknowledged. Thus the large doses of calomel,

which have been used with so much effect in controlling hepatic and other inflammations in warm countries, are rarely called for in this part of the world ; whilst on the other hand, the profuse use of purgatives which is borne with *comparatively* little injury in our colder regions, would speedily exhaust the system, or produce acute inflammation, in the inhabitants of a warmer clime, and especially of such native races as are of a peculiarly slight form and impressionable habit, as, for example, the Hindoos, who are known to require much smaller doses of these and most other medicines than the Europeans who reside amongst them.

The *reigning diathesis* will also ever powerfully influence the prudent prescriber in the adaptation of his remedies. Thus where autumnal cholera or dysentery is prevalent, he will be moderate in the use of such medicines as tend to irritate the mucous membrane ; when influenza or low fever reigns he will abstain from the very free use of lowering measures in slight ailments ; so on the other hand, when an inflammatory or bilious tendency characterizes the disorders of the season, he will display even in the earlier and less developed stages of a case a suitable activity in the use of their proper antagonists. The habitation of the patient, according as it is more or less healthy in point of locality and other circumstances which will readily suggest themselves, as well as the nature and abundance of the daily food, will also properly exercise a great influence over the details of treatment. No competent person would think of treating a pallid or emaciated manufacturer, the ill-fed inhabitant of a close and crowded lane in a city, with the same activity as a robust countryman, even supposing them both to be labouring under a similar inflammatory affection.

The *varying strength of medicines* is a source of considerable embarrassment in the regulation of the dose of some of the more powerful ones, and especially of those drawn from the vegetable kingdom. In the employment of the more energetic narcotics, their powdered leaves and extracts, it will be prudent, if the dose has already mounted up much above the initiatory quantity, on commencing a new parcel of the medicine, and especially if it be had from a new source, to make a great reduction in the dose, and again cautiously to ascend. This is peculiarly requisite in regard to the vegetable alkaloids and prussic acid, as from the high price of the former there is too great temptation to adulterate them, and the latter, from its volatile quality, as well as from occasional carelessness in its preparation, has been known to present a most startling inequality of strength, one drop of some retailers being equal (as was found on a careful examination made some years ago) to three or even four drops of the preparation sold by another. Under such circumstances, it is not surely to be wondered at that serious accidents should have, from time to time, occurred : we believe, however, that since regular formulæ for making these substances have been introduced into our pharmacopœias, the danger from this very perplexing source has been in some degree diminished.

The *time of day* most appropriate for the exhibition of different medicines varies with the intention of the prescriber. Hypnotics, should of course, in most instances, be given in preference towards night, as coinciding with the natural period of repose ; so likewise emetics, that the exhaustion subsequent to their use may be effaced by the nightly rest to which they often dispose. Aperients of slow operation should likewise be given at the same period, or else very early in the morning, so that their action may fall in the day, and not interfere with the enjoyment of sleep, as this is so very important to all patients in febrile as well as in chronic affections. For a similar reason, and to facilitate the adaptation of a due temperature by the reduction of the coverings to a very moderate quantity, diuretics should be given at such time that their operation may also coincide with the day ; whilst that of diaphoretics, on the other hand, is better directed on the night, when there is a natural tendency in the skin to relaxation ; though doubtless there will occur very many cases

where it will be proper for them to maintain their action both day and night, as is likewise so frequently the case with narcotics.

The *period allowed to elapse* between each dose of medicine, where it is necessary that it should be repeated, will vary with the object of its exhibition ; thus, for example, emetics should be administered in small quantities at a time, every five or ten minutes, tepid diluents being freely interposed, till the stomach has fully discharged itself of its contents.

Aperients generally act most mildly and effectually when given in small doses every three or four hours ; so likewise in respect to diuretics and diaphoretics ; whilst medicines calculated to induce sleep should, on the contrary, be administered in rather full doses, and at very distant intervals, as every twelve or twenty-four hours. For exemplifications of this and of most of the preceding remarks, as well as for several further necessary details, we must refer to the selection of prescriptions which follow.

EXTEMPORANEOUS FORMULÆ.

I. STIMULANTS.

Including aromatic and diffusible stimulants, carminatives, and stomachics, and also tonic stimulants, such as the mineral acids, irritants and counter-irritants, stimulant baths, &c.

By the term stimulant, or excitant, is meant a substance which speedily augments the action of the part to which it is immediately applied (generally a portion either of the mucous membrane or of the skin), and subsequently, after a very brief interval, that of the system at large through the medium of sympathy.

Medicines of this class, especially when introduced into the stomach, exalt at once the sensibility of the nervous system, and the action of the muscular fibre, as well as that of the mucous membrane. They augment the strength and frequency of the heart's pulsations, give vigour to the play of the lungs, and raise the temperature of the whole body. In some instances they prove excitant, and even irritant, to the urinary organs.

In their mode of action they approach most nearly to narcotics and to tonics. The former indeed, if regard be had only to their primary action, are not always satisfactorily distinguishable from stimulants. From tonics they differ, and especially the so-called diffusible stimulants, in the rapidity and comparatively evanescent nature of their action, in their power of increasing the susceptibility to external impressions, and the tendency they have to be followed by exhaustion when once their action is expended.

Their use is indicated chiefly in cases of temporary diminution of the nervous energy, and a feeble performance of the functions of various organs, as well as in pains of a nervous or spasmodic character. When they are intended to combat debility, as in the advanced periods of low fevers, their exhibition should at first be commenced experimentally, and their dose augmented in strength and frequency according to their observed effects, and especially according to their influence on the heart. When the pulse becomes slower and fuller under their use, the propriety of their continuance is clearly manifested, and particularly so if the sleep and powers of digestion are simultaneously improved. They should generally, on the other hand, be abstained from, or only very cautiously employed, where inflammation is present in an acute form in any part of the system. In chronic inflammation, however, their local

application is occasionally beneficial, either in consequence of a diminished action of the capillaries succeeding secondarily to the excitement at first caused by their use, or else by means of a more healthy species of action being impressed on those vessels.

The great majority of vegetable substances exerting a stimulant power, are indebted for it to the presence of an essential oil. Camphor, ether, or ammonia, manifest the same quality in a very marked degree. Fermented liquors, too, from the alcohol which they contain, rank high in the class of excitants, both in respect to their beneficial results when judiciously exhibited, and their injurious consequences when unnecessarily or too freely employed.

Their habitual use, and more especially that of those of a very stomachic or spirituous character, ought, in almost all instances, to be discouraged, as from the agreeable but treacherous excitement, both mental and corporeal, which immediately follows their exhibition, as well as from the distressing feelings of collapse which ensue upon the termination of their action, forthwith suggesting instinctively the desire of a repetition of the dose in a still stronger form, a tendency to confirmed dram-drinking is too apt to be the result.

In the imponderable agents, light, heat, and electricity, and especially the two latter, we are possessed of very potent means of exciting the animal system. The commonest form of employing caloric with this view is that of the warm water, simple or medicated vapour or air-bath, the temperature of the first being generally from 97° to 100°; that of the two latter being commonly raised some 20° or 30° higher. Sometimes heat is applied in a still more concentrated form, when we would instantaneously rouse the sinking powers of life; and this is effected by applying momentarily to the epigastrium or some other sensible part, a piece of metal, as the head of a hammer or bowl of a spoon, which has previously been held for some moments in boiling water, or close to, or even in the fire; or by inverting for an instant on the part we wish to stimulate, the mouth of a cup containing hot water, and having a piece of cloth braced tightly across it. Such applications are of course very painful, and apt to cause severe vesication; of counter-irritants of a somewhat milder character—liniments, stimulating baths, &c.—we shall subjoin several examples. Of moral stimulants, joy and hope are those of the greatest efficacy.

[The doses throughout are those suited for adults, where not otherwise expressed.]

℞ Spirit. Ammon. Arom. Spirit. Lavand. Comp. āā ℥j. Take a small teaspoonful in water when there is much flatulence or languor.

℞ Aquæ Carui ℥j. Tinct. Cardam. Co. ℥j. Spirit. Ammon. Arom. ℳ x. Syr. Croci ℥j. M. Fiat Haustus.

℞ Mist. Camph. ℥j. Spirit. Ammon. Arom. ℳxxx. Spirit. Lavand. Comp. Syr. Simp. āā ℥j. M. Fiat Haustus.

℞ Mist. Camph. ℥j. Spir. Æther. Sulph. ℥ij. Tinct. Cardam. Comp. ℥iv. Spirit. Anisi ℥vj. Olei Carui ℳxii. Syr. Zing. ℥ij. Aquæ Menthæ Pip. ℥vss. M. Fiat Mistura.

Take two tablespoonsful when there is severe flatulence.

℞ Magnesiæ ℈j. Ol. Carui. ℳiv. Spirit Ammon. Fœtid. ℳxx. Tinct. Opii. ℳv. Syrup. Simp. ℥ss. Aquæ Menth. Pip. ℥iss. M. Fiat Mistura. Take a teaspoonful every four hours. (In Diarrhœa and Flatulence in young children, continuing after the use of purgatives.)

℞ Aquæ Anethi ℥ij. Magnesiæ ℥ss. Tinct. Opii ℳ ii.—iv. Olei Aneth. ℳ ij. Sacch. Albi ℈ij. Confecti Arom. gr. x. M. Fiat Mistura. Take a teaspoonful three times a day. (In Colic of infants, accompanied by excessive vomiting and greenish un-

healthy stools, a substitute for Dalby's Carminative.

℞ Mist. Camph. 3x. Spir. Æther. Sulph. 3j. Confect. Aromat. Ɉj. Spirit. Lavand. Comp. 3ss. M. A draught to be repeated every fourth hour, or when the paroxysm is urgent. (In the sinking of Fever, attacks of Angina Pectoris, Palpitations, &c.)

℞ Magnes. Carb. 3iss. Spirit. Æther, Sulph. Comp. 3iij. Tinct. Cardam. Comp. 3ss. Spirit. Anisi 3v. Ol. Carui ♏viij. Syr. Zing. 3ij. Mist. Camph. 3jss. Aquæ Menth. Vir. 3v. M. Fiat Mistura. Take two tablespoonsful, having previously shaken the vial, when there is much nausea or flatulence.

℞ Misturæ Camphoræ 3vss. Ammon. Carbon. 3ss. Syr. Zing. 3iv. M. Fiat. Mistura. Take a tablespoonful every two hours. (In the prostration of Typhoid Diseases.)

℞ Ammon. Carb. gr. x. Valer. Pulv. Ɉj. Aquæ Cinnam. 3ij. M. Fiat Haustus. (In Nervous Headache.)

℞ Ammon. Carb. gr. xv. Aquæ Distil. 3j. Spirit. Myrist. 3j. Syr. Aurant. 3ss. M. Fiat Haustus. To be mixed with a tablespoonful of lemon juice, and taken during effervescence.

℞ Confect. Arom. 3ss. Opii gr. ij. M. Divide in Pil. viij. Take one every three hours. (In small doses repeated at short intervals, Opium has a stimulant effect.)

℞ Sodæ Sesquicarb. gr. xx. Syr. Aurant. 3j Aquæ 3iss. M. Fiat Haustus. To be taken with half an ounce of lemon juice. (To relieve Nausea and check excessive Vomiting.)

℞ Lactis. Vacc. Oj. Sinap. Sem. Contus. 3j. M. Boil together until a curd is formed, then strain. A cup of the whey to be taken occasionally.

℞ Acid. Hydrochlorici 3j. Aquæ Oj. Sacchari q. s. M. Fiat Mistura.

To be used as a common drink. (Stimulant and tonic in Typhoid Diseases.)

℞ Infus. Armor. Comp. 3j. Spirit. Ammon. Arom. 3ss. Syr. Zing. 3j. M. Fiat Haustus. To be given at intervals of six hours.

℞ Creasoti ♏x. Pulv. Glycyr. 3j. Muc. Acac. q. s. M. Divide in Pil. xx. Take two of the pills three times a day. (In Neuralgia, and Atonic Rheumatism, and Chronic Bronchitis; the number of Pills may be gradually increased to eight or ten at a time. Its effects are tonic and stimulant, and, in some instances, diuretic.)

℞ Creasoti ♏i. Mist. Camph. 3j. Fiat Haustus. (To check Vomiting, when unconnected with inflammation or organic disease, in Sea-sickness, and to enable the stomach to bear nauseous medicines. When tolerated, the dose may be gradually increased to several drops, but always in a large proportion of Menstruum—at least half an ounce to each drop—on account of its acrid qualities.)

℞ Mist. Camph. 3vj. Tinct. Guaiac. Ammon. 3ij. Muc. Acac. Syrupi āā 3j. M. Fiat Haustus. To be taken three times a day. (Chronic Rheumatism.)

℞ Decoct. Senegæ 3vjss. Muc. Acac. 3iv. Syr. Tolut. 3j. M. Fiat Mistura. Take three tablespoonsful every three hours. (In Catarrh attended with excessive secretion and debility.

℞ Arnicæ Mont. Flor. 3j. Aquæ Ferv. Oj. Let it stand for half an hour then strain. Two or three tablespoonsful to be taken three times a day. (In Paralysis, Chronic Rheumatism, Dysentery. Its use requires caution.)

℞ Pulv. Flor. Arnicæ, Camphoræ āā gr. iv. Theriacæ q. s. Fiat Bolus.

R Aquæ Menth. Vir. ʒvij. Confect. Rosæ Gall. ʒj. Acid. Sulph. Dil. ʒjss. M. Fiat Mistura. Three tablespoonsful to be taken every four hours, through a glass tube.

R Acid. Nitric. Dil. ʒjss.—ʒij. Aquæ ʒxxiv. Sacchari ʒjss. M. Fiat Mistura. Take three ounces three times a day through a glass tube. (In Typhoid Fever, Chronic Hepatic Affections, and Secondary Syphilis.)

R Acid. Nitromuriat. ʒij. Aquæ ʒxxiv. Sacchari ʒjss. M. Fiat Mistura. Take three ounces three times a day through a glass tube. (In similar cases to the above, and in malignant Scarlet Fever.)

R Liquoris Calcis Chloridi (Ph. Lond.) ℳ xxx.—lx. Mist. Camph. ʒij. Syr. Aurant. ʒij. M. A draught to be repeated every four or six hours, followed by a cup of barley water. (Typhus Fever and Dysentery. The " Liquor Labarraquii Chloro-sodaicus" may be given in similar cases and doses.)

R Olei Tereb. Rect. ʒj. Vitel. Ovi unius ; tere simul et adde gradatim ; Mist. Amyg. ʒiv. Syr. Aurant. ʒij. Tinct. Lavand. Comp. ʒiv. Ol. Cinnam. ℳ iv. Fiat Mistura. Take two tablespoonsful three times a day. (In Iritis, Chronic Rheumatism, &c.)

R Olei Tereb. ʒij. Pulv. Caps. gr. x. Mellis ʒiv. Pulv. Rad. Glycyr. q. s. M. Fiat Elect. Take a tablespoonful three times a day, with a draught of any warm thin drink.

R Copaibæ Bals. ʒiij. Liq. Potassæ Carb. ʒjss. Decoct. Hordei ʒvijss. First rub together the copaiba and the solution of the carbonate; then gradually add the barley water. Take from an ounce to an ounce and a half three times a day.

R Copaibæ Bals. Magnes. āā ʒj. M. Divide in Pil. cc. Take from six to twelve three times a day.

R Piper. Cubebæ ʒj. Sacch. Albi ʒij.

Muc. Acac. ʒij. Aquæ Cinnam. ʒvj. M. Fiat Emulsio. Take two tablespoonsful three times a day. (Gonorrhœa, Gleet, &c.)

R Canthar. Pulv. gr. ij. Camphoræ gr. iv. Extr. Hyosc. gr. vj. Rub together carefully and divide in Pil. iv. Take one twice a day and afterwards drink freely of barley water. (In obstinate Gleet, Incontinence of Urine from debility of the bladder. Its use requires great caution. The Tincture is a more manageable form.)

R Bals. Peruv. ʒij. Vitel. Ovor. ij. tere simul et adde Extr. Cinch. ʒiv. Mell. Ros. ʒvj. M. Take a tablespoonful three times a day. (Chronic Bronchitis.)

R Tinct. Capsici ʒiv.—viij. Aquæ Rosæ ʒvj. Syr. Rosæ Gall. ʒj. M. To be used as a gargle, frequently during the day. (Cynanche Tonsillaris.)

R Capsici Pulv. ʒij. Sodii Chloridi ʒj. Aquæ Bullientis ʒvj. M. Let it stand half an hour, strain, and add to the strained liquor six ounces of vinegar. For a gargle. (Cynanche Tonsillaris.)

R Potassæ Nitrat. ʒij. Decoct. Hordei ʒvij. Mellis Rosæ ʒj. M. A gargle. (Common Sore throat.)

R Infus. Rosæ Comp. ʒvjss. Acid. Sulph. Dil. ʒss. ; Mellis Rosæ ʒjss. M. A gargle.

R Liquor. Chloro-sodaici (Lobarraquii) ʒjss. Aquæ Distill. ʒvj. Mellis ʒss. M. A gargle. (Angina Gangrenosa.)

R Muc. Acac. ʒviij. Ol. Tereb. ʒij. M. A gargle. (In Ptyalism.)

R Sodæ Sub-borat. ʒij. Mellis Rosæ ʒij. Tinct. Myrrhæ ʒij. Aquæ ʒvj. M. A gargle.

R Acidi Hydrochlorici ʒj.—ʒjss. Syr. Rosæ Gall. ʒj. Dec. Hordei ʒvij. M. A gargle.

℞ Liq. Calcii Chloridi (Ph. Lond.) ℥iv. Aquæ ℔j. M. A gargle. (Cynanche. Serves also for a lotion to Burns. Gangrenous Sores, Scorbutic and Mercurial Ulceration of Gums, &c. and a somewhat stronger solution in Psora, Porrigo Favosa, Diphtherite, &c.—viz., four parts of water to one of the Liquor.)

℞ Decoct. Hordei ℥xij. Liq. Calcii Chloridi (Ph. Lond.) ℥iv. M. An enema, to be administered night and morning. (In Typhus, Dysentery, Cancer Uteri. A strong solution of the Chloride of Soda or of Lime is very useful as a disinfector, when sprinkled over the bed-clothes, floors and excretions.)

℞ Aquæ Chlorinii (Saturatæ) ℳv.—x. Aquæ Tepidæ ℥iv. M. The vapour to be inhaled immediately after the mixture is made. (Gangrene of the Lung, Phthisis. Stimulant and Antiseptic. The inhalation may be continued for about five minutes, and repeated seven or eight times in the day.)

℞ Tinct. Iodinii ℳx.—xx. Aquæ Tepid. ℥iv. M. The vapour to be inhaled immediately after the mixture is made. (Phthisis ; requires much caution as well as the preceding. Their use should be immediately interrupted where undue irritation of the bronchial lining membrane is the result. The safest and most effectual method of inhaling Chlorine or Iodine is by allowing either of the above preparations to drop slowly by means of a cotton wick on water kept at the boiling point by a spirit lamp, so that the vapour shall be steadily diffused throughout the apartment for several hours at a time, and always in a dilute form, and accompanied by a sufficient supply of aqueous vapour, as in the ingenious apparatus described by Dr. Corrigan. N. B. For additional formulæ containing Iodine, see ALTERATIVES.)

℞ Olei Tereb. ℥j. Aquæ Tepid. ℥xij.

Inhale the vapour. (In Chronic Catarrh with profuse expectoration.)

℞ Sinapis Pulv. Micæ Panis āā ℥iij. Aceti Tepid. q. s. M. Fiat Cataplasma. (Applied to the chest for a quarter of an hour at a time in incipient Catarrh ; and to the feet as an excitant in the Collapse of Fever, &c. Should not be kept on long, else troublesome ulceration may ensue.)

℞ Sinapis Pulv. ℥iv. Aquæ Tepidæ q. s. Fiat Pediluv. (In Congestions of Head or Chest. Amenorrhœa, &c.)

℞ Acid. Hydrochlor. ℥ij.—iv. Aquæ Tepid. (96°) q. s. ut fiat Pediluv. (About four gallons.)

℞ Acidi Nitromuriat. ℥ij.—iv. Aquæ Tepid. (96°) ℔xxxij. M. Fiat Pediluvium. (In Dyspepsia with Hepatic Derangement and Constipation. It may also be used for sponging the abdomen and limbs. When applied as a bath to the whole body, the proportion of acid should be much smaller than this, or about one ounce to every eight gallons. The vessel employed should be of wood.)

℞ Potass. Carb. ℥iv. Aquæ Tepid. ℔ccc. M. For an alkaline bath. (Bran Decoction or Isinglass are occasionally added if the skin be very irritable.)

℞ Manganesii Binoxidi ℥j. Sodii Chloridi (Salis Communis) ℥iij. Tere optime simul. Adde Acidi Sulph. ℥j. Aquæ ℥ij. M. (The chlorine evolved from this mixture on the application of heat forms a powerful means of stimulating the surface in certain Cutaneous Affections and in Rheumatism, as well as of increasing the action of the liver in deranged states of that organ where Mercury might be unsuitable. The gas is received within an appropriate apparatus, so constructed, that while it acts on the skin it cannot reach the air-passages or eyes. It consists

in a large wooden box to receive the body, with an aperture in the top through which the head passes. Round this aperture there is affixed a leathern cap furnished with a running string case, by means of which it can be drawn accurately around the top of the forehead and under the chin. The patient remains exposed to the action of the gas, at a temperature of about 112°, from fifteen minutes to half an hour every second day. A similar contrivance is applicable to sulphurous acid fumigations, the gas being evolved from sulphur in a state of combustion (a wick being passed down through it in a crucible). Aqueous vapour may, if requisite, be mingled with either of these gases by allowing water to drop slowly on a heated iron. Whichever of these gases is employed, it must be entirely withdrawn from the box, by means of a sufficient draught of atmospheric air at the end of the operation, and before the patient ventures to detach the head-piece, else injurious pulmonary irritation might ensue. The above mixture serves also for *fumigating* infected apartments, being placed in a china basin within a vessel of heated sand, the doors and windows being kept closed for an hour or upwards, and no one remaining in the place at the time, nor till after a free current of fresh air has been allowed to pass through it.)

℞ Acid. Acet. ʒss. Olei Tereb. ʒjss. Vitellum Ovi. j. Ol. Limon ʒss. Aquæ Rosæ ʒij. M. Fiat Liniment. (Applied with steady friction. A powerful counter-irritant, not suitable to irritable habits. The effect of Liniments depends very much on the degree of friction employed. There is good reason to believe that much of the occasional efficacy, as well as some of the dangerous results, of a nostrum of this kind of recent celebrity, were due to the quantum of friction with which it was applied, and the comparative sensibility of the patients' skins.)

℞ Ol. Croton. Tiglii ♏ x. Adipis ʒss.

M. Fiat Unguentum. Let a piece of the size of a nutmeg be rubbed on two or three times a day until it produce an eruption. (A useful counter-irritant in internal inflammations after the acute stage is past, as in Laryngitis, &c. ; also in Neuralgia.)

℞ Antim. Potassio-tartratis Ðij. Tinct. Canthar. ʒj. Aquæ Rosæ ʒij. Dissolve the tartarized antimony in the rose water warmed, and then add the tincture. For an embrocation. (To produce an artificial eruption if the common ointment of Tartrate of Antimony has failed.)

℞ Liq. Ammon. Fort. ʒj. Spir. Rosmar. ʒvj. Spirit. Camphoræ ʒij. M. A counter-irritant solution. (This very potent counter-irritant, applicable both to Neuralgia and Inflammatory Affections, where a very rapid stimulation of the surface is proper, is applied by means of a compress moistened with it, and firmly pressed on the seat of the pain or over the trunk of the nerve leading to it ; if on the face, the eyes should be carefully protected, by a thickly folded napkin, against the ammoniacal fumes. The application to be continued from a few seconds to six or eight minutes, according as we wish to produce a merely rubefacient effect or to vesicate. The only after-dressing requisite, if any, is a light water dressing. This lotion is somewhat weaker than an analogous one employed by Dr. Granville. Its strength may be increased by diminishing the quantity of the second or third ingredient.)

℞ Linim. Sapon. C. ʒjss. Liq. Ammon. Tinct. Canthar., Tinct. Opii. āā ʒj. M. Fiat. Linimentum. (In Colic and other local pains.)

℞ Olei Succini ʒj. Tinct. Opii ʒiv. M. Fiat Linimentum. (In Neuralgia.)

℞ Linim. Ammon. ʒjss. Ol. Tereb. ʒss. Ol. Cajeputi ʒij. M. Fiat Liniment. (A powerful counter-irritant in Chronic Rheumatism, Sciatica, &c.)

℞ Creasoti ♏ v.—xxx.   Adipis ℥ss. M. Fiat Unguentum. (Acne, Sycosis, Lepra, Psoriasis, Ozœna, and ill-conditioned Ulcers.)

℞ Creasoti ♏ iv.; Aquæ ℥j. M. Fiat Embrocatio. (In facial Rheumatism. Its strength may be gradually increased. Creasote is also used for inhalation, a few drops in boiling water, in Chronic Bronchitis.)

℞ Potass. Sulphuret, Saponis Albi āā Ʒij.   Aquæ Calcis ℥vij.   Alcohol Rect .Ʒj.   M.   Fiat Lotio.   (In Porrigo Favosa and Psora.)

℞ Potass. Carb. Ʒj.   Sulphur. Precip. Ʒij.   Adipis ℥iv.   M.   Fiat Unguentum.   (In Psora.   Used in the Hôpital St. Louis.   Cures within from 7 to 14 days, applied nightly.)

℞ Sulphuris ℥v.   Potass. Carb. Ʒij. Aquæ ℥j.   Ol. Olivar. ℥iv.   Dissolve the potash in the water, and then add the sulphur. (In Psora. Used in the Hôpital St. Louis.)

℞ Picis Liquidæ ℥iv.   Ceræ Flavæ Ʒiv. Melt with a gentle heat, and before it cools, incorporate with it, Sulphur Ʒj.   For an ointment.   (In Impetigo Favosa, Porrigo Scutulata, &c.)

℞ Sodæ Causticæ, Sulphureti Potass. āā Ʒiij.   M.   Fiat Unguentum.   (In Tinea.)

℞ Potassæ Sulphureti ℥iv.   Aquæ Tepidæ (94°—96°) ℔cc.   M.   For a bath.   (A stimulant bath applicable to various Cutaneous Affections, Rheumatism, &c.   When it was found too irritating, Dupuytren was in the habit of adding to it two pounds of white Flanders glue dissolved in ten pints of boiling water. When on the other hand it is used for the cure of Itch, the quantity of the sulphuret may be increased fourfold.

A *salt water bath* may be formed by the addition of a quarter of a pound of common table salt to each gallon of water.)

℞ Hydrarg. Bichloridi gr. ss.—ij. Misturæ Amygdal. Amar. ℥vj.   M. Fiat Lotio.   (In Acne.)

℞ Hydrarg. Ʒss.   Acid. Nitric. ℥j. Solve. Adde Aquæ Distil. ℔ijss. M. Fiat Lotio.   (In Psora and Prurigo about half an ounce of it is used night and morning.   It cures the Itch, on an average, in about three weeks, and is free from the disagreeable odour of sulphurous applications.)

℞ Argent. Nit. gr. j.—ij.   Aquæ Distil. ℥j.   M.   Fiat Collyrium.   (In Catarrhal Ophthalmia.   The bottle should be covered and kept in a dark place. A much stronger solution (gr. x. to ℥j.) has been employed in Ophthalmia Neonatorum, and a similar one has been used as an injection into the anterior part of the urethra in incipient Gonorrhœa (a dubious practice,) and as a stimulant wash to gangrenous and other ulcerations, whose action it is desirable rapidly to change.)

℞ Argent. Nit. gr. x.   Ung. Cetac. Ʒj. Liq. Plumbi Acet. ♏ x.   Misce optime. Fiat Unguentum. (*Guthrie*). (Purulent Ophthalmia.   The size of a pin's head to be introduced between the eyelids.)

℞ Calomelanos gr. cc.   Arsenici Oxid Albi Pulv. gr. j.   Misce optime.   (In Lupus.   To be thinly sprinkled over a small portion of diseased surface by means of a puff.   Dupuytren found this almost specific.)

Stimulants acting principally on the Spinal Marrow and Motor Nerves.

℞ Strychn. Nucis Vomicæ Pulver. gr. iij. Pulv. Acac. Ʒj.; Aquæ Cinnam. Ʒjss. Tinct. Cardam. Comp. Ʒj. M. A draught, to be taken three times a day. (In cases of partial Paralysis depending on impairment of the functions of the spinal marrow and nerves of motion, as after slight injuries of

the back, Colica, Pictonum, &c., and unconnected with cerebral congestion, or with inflammatory or organic disease; the dose may be gradually increased up to x. or xij. grains, or till spasmodic contractions of the muscles have been produced. In moderate doses (iij. to v. grs.) it has been found useful in Dyspepsia unconnected with inflammation of the mucous membrane of the stomach; in Pyrosis and cases of mere functional disorder, indicated by slight pain, distension, and flatuence, after meals. (For its use in Dysentery and Diarrhœa, see ASTRINGENTS.) In excessive doses it produces alarming cerebral congestion, as manifested by stupor, vertigo, ringing in the ears, sleeplessness, and a flushed countenance. In cases of Paralysis, the powder is a less convenient and accurate form of administering the remedy than the extract and the alkaloid obtained from the nut.)

℞ Extract. Nucis Vomicæ Əj. Confect. Rosæ Gall. ʒij. Misce optime. Divide in Pil. lx. Take one every night and morning. (In Paralysis of the limbs, eyelids, sphincters of the bladder and rectum, &c. Amaurosis unaccompanied by congestive or inflammatory symptoms, &c. The dose may be gradually increased as far as two or three grains of the extract, or till its specific effect on the muscular system takes place. The bowels should be kept regular during its employment by occasional aperients.)

℞ Strychniæ gr. j. Conf. Rosæ. Gal-licæ Əj. Misce optime. Divide in Pil. xij. æquales. Take one night and morning. (In partial Paralysis. The dose may be cautiously increased to four or five of these pills at a time, or till Tremors and Tetanic Spasms of the muscles, or some of the other evidences of its influence mentioned above, begin to manifest themselves. In Amaurosis, Strychnia has also been employed endermically to the extent of the twelfth of a grain to a small blistered surface on the temple or brow, or in front of the ear.)

℞ Strychniæ gr. j. Sacchari Albi ʒij. Aquæ Distillatæ ʒij. Aceti ♏ij. M. Fiat Mistura. Take one or two tablespoonsful night and morning.

℞ Strychniæ gr. ij. Spirit. Rectificat. ʒj. Solve. Of this tincture the dose is ten to thirty minims.

The following is a local Stimulant acting specially on the Uterus.

℞ Ergotæ (Secalis Cornuti) ʒj. Aquæ ʒiij. M. Decoque celeriter ad ʒjss. Of the decanted decoction take one-third three times in the course of an hour. (In lingering labours, when dependent merely on deficient action in the uterus. A tablespoonful to be taken every twenty minutes to the third time if necessary. The Ergot of Rye has been also used to check hæmorrhages from the uterus, bladder and lungs, in doses of ten grains every second hour, to the third or fourth time, and in still smaller doses (v. gr. thrice a day), in Leucorrhœa.)

II. NARCOTICS.

Including Anodynes and Sedatives.

THE principal characteristic of this class consists in the power of lowering the energies of the system generally, and consequently diminishing the action of the several organs of the body, but more especially of the brain and nervous system. Immediately upon their exhibition, however, they commonly produce,

though in very various degrees, a stimulant operation, of which when given in small quantities at a time, and frequently repeated, we may avail ourselves as a valuable means of excitement in some cases. Generally speaking, however, and especially when they are given in full doses and at distant intervals, the excitement succeeding to the administration is so evanescent and so immediately followed by a state of collapse, as to be for the most part altogether overlooked. They are called *anodynes* in reference to their power of easing pain ; *hypnotics*, or *soporifics*, when given in full doses to enforce sleep ; and *sedatives*, when exhibited with a view to diminish action, alleviate spasm, or control excessive secretions. Some individuals of the class, as prussic acid, tobacco, digitalis, and certain poisonous gases, as the sulphuretted and carburretted hydrogen, and carbonic acid, exercise on the system a much more marked and exclusively depressing or sedative influence than the rest. Though the action of the greater number of them is directed mainly upon the brain and nerves, a few, as tobacco and digitalis, seem to expend their force chiefly on the heart and circulation.

Opiates tend to diminish all the secretions except perhaps that of the skin. The constipation to which they are thus apt to give rise should be combated by the simultaneous exhibition of mild aperients. Some narcotics, however, as hyoscyamus, are free from the inconvenience in question. In full doses they lower the temperature of the body, reduce the frequency and freedom of the inspirations, and so interfere with the adequate decarbonization of the blood. When exhibited in acute inflammation after free venesection, in order to prevent the injurious reaction which is so apt to ensue thereon, the dose should be a large one, as fractional doses rather, as we have just seen, tend to excite than to reduce vascular action.

Narcotics, when continued for any length of time, must be given in progressively increasing quantities, as the system becomes by use less sensible to their influence. When applied externally, their effects, though less in degree, are similar in kind to those produced by their introduction into the stomach or intestines.

When taken in excessive doses they produce vertigo, impaired vision, stupor, and occasionally convulsions and fatal coma. The principal object to be effected in such cases is their instant evacuation, either by the stomach-pump or emetics, whilst at the same time the action of the brain, heart, and lungs, is to be sustained by appropriate stimuli, external and internal, by forced muscular exertions, and if all other measures fail, by the employment of artificial respiration.

In the debilitated, and those unaccustomed to their use, the incipient doses should be very moderate, and even in changing from one species of narcotic to another, we must descend to a very low point in the scale. In cases where congestion of the brain is a prominent symptom, as well as in the advanced stages of disease of the heart, when they might too far depress its already deficient powers, their use requires great circumspection ; so likewise in diseases of the lungs, when their ill-timed or excessive employment might, by at once interfering with expectoration and with freedom of inspiration, tend to augment pulmonary congestion, and to prevent the due action of the air on the blood.

℞ Opii gr. j. Fiat Pilula. To be taken at bed-time. (To procure sleep.)

℞ Opii Extr. Aquos. gr. j. Pil. Galbani Comp. gr. iv. M. Fiat Pil. To be taken at bed-time.

℞ Opii gr. j. Pil. Aloes cum Myrrhâ gr. vij. M. Divide in Pil. ij. To be taken at bed-time. (The aperient pill added to counteract the constipating effect of the opium.)

℞ Extr. Opii Aquos. gr. j. Camphoræ gr. ij. Syrupi q. s. ut fiat Pil. j. To be taken at bed-time.

℞ Tinct. Opii ℳxx. Aquæ Cinnam.

ʒjss. M. Fiat Haust. To be taken at bed-time.

Aceti Opii (vel *Guttæ Nigræ*) ℳx. Mistura Camphoræ ʒj. M. Fiat Haust. To be taken at bed-time. (This preparation has less tendency to confine the bowels, and disorder the head and stomach, than opium or its tincture.)

℞ Mist. Camphoræ ʒj. Tinct. Opii ℳxxx. Liq. Antim. Potassio-Tart. ℳxxv. M Fiat Haust. To be taken at bed-time. (Narcotic and diaphoretic.)

℞ Conf. Opii Əj. Aque Menthæ Pip. ʒj. Syr. Zing. ʒj. M. Fiat Haust. (Flatulent Colic, Atonic Gout.)

℞ Tinct. Opii ℳxxv. Spir. Æther. Sulphur. ℳxxx. Syr. Tolut. ʒjss. Mist. Camphoræ ʒj. M. Fiat Haust. Anodynus.

℞ Opii Pulv. gr. j. Potass. Nit. gr. xij. Sacch. Albi Əij. M. Divide in Pulv. vj. Take one every two hours.

℞ Opii Pulv. gr. ij. Antimon. Potassio-Tart. gr. j. Theriacæ q. s. ut fiant Pil. iv. Take one twice a day. (Rheumatism.)

℞ Opii gr. ij. Saponis Duri gr. iij. Fiat Suppositorium. M. (To procure sleep, and to allay pain in the bladder, rectum, or uterus.)

℞ Tinct. Opii ℳxl. Mucilag. Amyli ʒiv. M. Fiat Enema. (In Dysentery, &c.)

℞ Mist. Cretæ ʒvj. Conf. Arom. ʒij. Tinct. Opii ℳxxx. Aque Cinnam. ʒij. M. Fiat Mistura. Take two tablespoonsful after each loose stool. (Chronic Diarrhœa.)

℞ Pulv. Cretæ Comp. cum Opio Əj. Sys. Simpl. ʒj. Aquæ Cinnam. ʒxj. M. A draught to be repeated every six hours. (In Chronic Dysentery and Diarrhœa.)

℞ Aquæ Distil. ʒj. Muc. Acac., Syr. Symp. āā ʒss. Tinct. Opii ℳj. M.

(A narcotic mixture for infants.) (Of this narcotic mixture, an infant in the first month may take a teaspoonful every half hour till sleep is induced; in the second month two teaspoonsful.)

℞ Pulv. Ipecac. Comp. gr. j. Sacchari. Əj. Misce optime. Divide in Pulv. iv. Give one for a dose. (Safe opiate for very young infants—as from one to four weeks old.)

℞ Morphiæ Acet. gr. xvj. Aquæ Distil. ʒvij. Acid Acet. ℳiv. Alcohol ʒj. M. Take six minims (to be gradually increased to thirty if necessary) in a very little water.

℞ Morphiæ Acet, gr. j. Aquæ Distil. ʒj. Solve. Take a teaspoonful at bed-time; or, when the pain is urgent, every six hours. (To procure sleep and allay pain. Less stimulating and constipating than Opium or its tincture. The dose may be gradually and cautiously raised, as it loses its effect, to a grain and even more at a time; but it is prudent in the case of so energetic a medicine, to begin with an under-dose where the patient is unaccustomed to the use of opiates, or in a debilitated condition. The hydrochlorate (Muriate) of Morphia has been thought by some to be preferable as a narcotic to the Acetate; either it or the Sulphate, in similar quantities, may be substituted for the Acetate when the latter begins to lose its influence; but on making such changes we should at first always descend to a lower dose. The pillular form is attended with more risk than the solution. In certain idiosyncrasies these and all other opiates produce an alarming degree of sinking; in such cases they should always be exhibited in combination with an aromatic tincture. The Salts of Morphia may also be employed endermically—from a quarter of a grain to one grain being sprinkled over a small blistered surface, once or twice in a day. Their use in this form also requires extreme caution, from the rapidity with which their narcotic effects ensue.)

℞ Acid. Hydrocyan. Dil. (vel Medici-nalis) ♏ij. Mist. Amyg. ʒij. M. Fiat Haustus. (In Irritability of Stomach (Nervous Vomiting and Pyrosis) and Palpitations dependent thereon, Angina Pectoris, Sapsmodic and Phthisical Cough, &c. The dose may, if requisite, be gradually in-creased to five or six drops, and in the case of very delicate individuals, it may for precaution be taken in divided portions at the interval of a few minutes. Its use requires ex-treme caution. When given in a mixture, the bottle should be well shaken before each dose. We should continue to get it from the same source during its use ; or else return to smaller doses, as its strength varies remarkably at different shops.)

℞ Aquæ Lauro Cerasi ♏xv. Mist. Amyg. ʒij. M. Fiat Haustus (In Dyspepsia, Nervous Cough, &c. Dose may be gradually increased to one drachm.)

℞ Extr. Conii ʒss. Pulv. Folior. Conii gr. xv. M. Divide in Pil. xv. Take one three times a day, increasing the dose if necessary. (In Cancer, and other painful affections of a chronic nature, especially when Opium dis-agrees, or produces troublesome con-stipation.)

℞ Extr. Conii Əj. Pulv. Ipecac. Comp. ʒss. M. Divide in Pil. x. Take one every three hours. (In painful affections.)

℞ Extr. Conii gr. iij. Magnes. Sulph. ʒss. Aquæ Carui. ʒv. Syr. Tolut. ʒj. M. A draught to be taken three times a day.

℞ Extr. Hyosc. gr. xij. Camphoræ gr. vj. Spir. Rectif. ♏ij. Tere simul. et divide in Pil. vj. Take two every night.

℞ Extr. Hyosc. gr. iij. Extr. Conii gr. ij M. Fiat Pil. j. To be taken at bed-time.

℞ Extr. Hyosc. gr. iv. Colomelanos gr. j. M. Fiat Pil. j. To be taken every night.

℞ Extr. Conii ʒj. Pulv. Digit., Calo-melanos, āā gr. v. Tere optime simul, et divide in Pil. xv. æquales. Take one three times a day.

℞ Succi Spiss. Lactucæ Vir ʒss. Pulv. Trag. Comp. Əj. Potass. Nitr. Əij. Mist. Amyg. ʒiv. M. Fiat Mistura. Take a tablespoonful three times a day.

℞ Extr. Lactutæ Sativæ gr. iv. Cam-phoræ Rasæ. gr. j. M. Fiat Pil. j. To be taken at bed-time. (A seda-tive, which does not, in moderate doses, produce the disagreeable nar-cotic effects of most of the class.)

℞ Stramonii Seminum ʒij. Vini Albi ʒviij. Spir. Rectific. ʒj. M. Ma-cerate two days and strain. (The dose of this preparation, which was thought by Hufeland superior as an anodyne to Opium, is from vi. to xx. drops, in a glass of sugar and water.)

℞ Extr. Stramonii gr. j. Extr. Glycyr. gr. vij. M. optime. Divide in Pil. iv. Take one night and morning. (In Asthma, and other Spasmodic Affections, the dose may be gradually raised to three grains and upwards.)

℞ Extr. Aconiti. gr. j. Extr. Glycyr. gr. vij. M. optime. Divide in Pil. iv. Take one night and morning. (In obstinate Chronic Rheumatism. Syphilitic Nodes, Scirrhus. The dose may be cautiously increased to half a grain at a time.)

℞ Pulv. Digit., Pulv. Scillæ āā gr. xij. Extr. Hyosc. gr. xviij. M. Divide in Pil. xij. Take one three times a day. (In Angina Pectoris, Asthma, and chronic Bronchitis, complicated with diseased heart.)

℞ Tinct. Digit. ʒjss. Tinct. Hyosc. ʒj. Mist. Camp. ʒiv. Fiat. Mist. A tea-spoonful to be taken as occasion may require. (Anodyne and sedative in palpitations connected with Hyper-trophy, Angina Pectoris, &c.)

℞ Extr. Belladonnæ gr. iv. Succi Spiss. Sambuci Nigri ʒss. Divide in Pil.

xvj. Take one every six hours. (In Hooping-cough and Scarlet Fever in Italy; but generally at shorter intervals, as two hours, between each dose. The dose is that for an adult, and may be gradually increased to 4 or 5 pills.)

℞ Extr. Belladonnæ gr. ij. Aquæ Distil. ℨj. Fiat Mistura. Take from two to five minims daily. *Hahnemann.* (Supposed prophylactic against Scarlet Fever. Children above six years may take double the above doses. A solution of about four times the above strength has also been used in Germany, in doses of from v. to x. drops to check Nervous Vomitings.)

℞ Opii ℨij. Aquæ Ferv. ℔j. Solve pro fomentatione.

℞ Tinct. Opii ℨj. Aquæ ℔j. M. Fiat Lotio. (Anodyne and refrigerant.)

℞ Sodæ Carb. ℨij. Extr. Opii gr. x. Calcis ℨj. Adipis ℥ij. M. Fiat Unguentum. (Prurigo.)

℞ Lin. Camphoræ Comp. ℥ij. Tinct. Opii ℨij. M. An embrocation for the spine. (In Hooping-cough, also in Rheumatic and Neuralgic pains.)

℞ Opii et Camphoræ, āā ℨss. Empl. Plumbi q. s. M. A plaster to be applied to the breast. (Angina Pectoris.)

℞ Conii Fol. Exsic. ℥j. Aquæ ℔ijss. Boil to ℔ij. and strain. For a fomentation. (In Scrofulous Ulcerations, Cancer, &c.)

℞ Conii Fol. Exsic. ℥ij. Med. Panis ℥vj. Aquæ Fervent. ℔j. Boil together to make a cataplasm. (Cancer, &c.)

℞ Extr. Belladonnæ ℨij. Cerat. Cetac. ℨj. M. Fiat Ung. (In Spasmodic Stricture of the Rectum, or Sphincter Ani, or Neck of the Bladder to be rubbed on the perineum; also in inflamed Piles, Scrofulous Swelling of the Joints, &c. and Dysentery.)

℞ Extr. Belladonnæ ℨj. Lin. Saponis ℥viij. M. Fiat Liniment. ('Tic Douloureux, &c.)

℞ Fol. Belladonnæ gr. xij. Aquæ Fervent. ℨvj. Macera. Fiat Enema. (In Spasmodic Contraction of the Urethra, preventing the introduction of catheter. The employment of this and all other forms of Belladonna require much caution; their effects should be closely watched.)

℞ Extr. Belladonnæ ℨij. Aquæ Cal. ℨviij. Olei Amyg. ℥iv. M. Fiat Lin. (In Acute Eczema and Impetigo: to be applied with a feather.)

℞ Extra. Belladonnæ ℨj. Emp. Saponis ℨij. M. A plaster to be applied to the præcordial region. (Angina Pectoris. It should be renewed weekly.)

℞ Tabaci. Fol. ℨij. Aquæ Ferv. ℔iv. M. Strain for half an hour. A fomentation for the abdomen. (In Acute Dysentery, Lead Colic, &c. The fomentation to be continued till dizziness or nausea supervene.)

℞ Acidi Hydrocyanici Dil. ℨj.—iv. Decocti Malvæ ℔j. M. Fiat Lotio. (In Irritable Cutaneous Affections, to correct itching (Acne and Impetigo); in Ulcerated Cancer, to diminish pain. The bottle should be well shaken before each application.)

℞ Veratriæ gr. iv. in alcohol. ♏vj. solutæ; Adipis ℨss. M. optime. Fiat Unguentum. (In very painful Chronic Rheumatism, Neuralgia, Angina Pectoris, Gouty and Rheumatic Paralysis, &c. about the size of a small nut, to be rubbed in night and morning. Its strength may be gradually increased to double the above. It causes heat and tingling in the part, sensations which sometimes extend after a few days over the whole body, accompanied occasionally by muscular twitchings of the mouth and eyelids. Though it modifies so remarkably the sensibility of the parts on which it is

rubbed, it produces no external marks of irritation. It has sometimes caused Diuresis and Constipation; yet its internal use in the form of tincture and pill, in doses of from the sixteenth to the half of a grain has been resorted to by Magendie with success in cases of obstinate Constipation in old persons, and as a substitute for the eau médicinale, a practice which, however, from the virulent nature of the poison, we by no means recommend for imitation. The author just named has used it also endermically to the amount of a grain, applied to a small blistered surface over the course of the nerve, in violent tic of the face, the application being renewed at a fresh point every fifth day. The experience of Dr. Copland and most others who have employed it recently in painful affections, by no means confirms the high eulogium passed on the ointment of Veratria some years ago; for, like other remedies, it very often disappoints us in these cases. Its exceeding high price also limits its use. See *Gully's Translation of Magendie's Formulæ.*)

℞ Aconitinæ gr. ij.—iv. Alcohol. ℥vj. Adipis ℨss. M. optime. Fiat Ung. (In similar cases to the above, and like it, its effects must be carefully watched.)

℞ Liq. Potass. ℨij. Acid. Hydrocyan. Dil. ℨj. Mist. Amyg. ℨviij. M. Fiat Lotio. (In Prurigo; and also, omitting the Liq. Potass., in Eczema.)

℞ Mist. Amyg. ℨvj. Hydr. Bichloridi gr. j. Fiat Lotio. (To check the itching of Lichen, a drachm of dilute Hydrocyanic Acid may occasionally be added with advantage.)

℞ Acid. Hydrocyan. ℨij.—iv. Aquæ Distil. ℨviij. Alcohol. ℨiv. Acet. Plumbi gr. xvj. M. Fiat Lotio. (In Impetigo with excessive itching.)

℞ Potassæ Cyanidi gr. xij. Mist. Amyg. ℨvj. M. Fiat Lotio. (In Lichen and other Chronic Eruptions attended with much pruritus.)

℞ Potassæ Cyanidi gr. xij. Olei Amyg. ℨij. Ung. Ceræ Albæ ℨij. M. Fiat Ung. (In Lichen and Prurigo, when the skin is very dry and the pruritus severe.)

℞ Cocculi Suberosi (Indici) ℨj.—ij. Adipis ℨj. M. Fiat Unguentum. (Porrigo Scutulata (Ringworm). Narcotic and stimulant. An Indian remedy of some celebrity in the same affection, consists of an ounce of Galls along with the same quantity of Lard, and one scruple of Sulphate of Copper.)

III. ANTISPASMODICS.

OF the substances which tend to put an end to irregular muscular contractions, some owe this power to their narcotic, and others to their tonic qualities; the former apparently obviating, by their sedative influence, the irrritation on which spasmodic actions is so often dependent; the latter counteracting debility, a condition in which this morbid phenomenon is likewise peculiarly apt to manifest itself. Another set appear to act mainly by their stimulant nature, enabling them to make so strong an impression on the nerves of the suffering organ, as is sufficient to counterbalance the diseased excitement in which the spasm originates. There are yet others, such as musk, castor, valerian, and assafœtida, which without being strikingly endued with any of the qualities just named, seem to exert a specific power of alleviating spasm. The change of action which they induce is not succeeded by any marked degree of collapse, as is the

case with some of the other agents just now mentioned. Their influence, however, being like that of narcotics, of a fleeting nature, they ought to be administered either immediately before an expected attack, or frequently repeated during its continuance. Narcotics themselves too, when given with the intention of counteracting spasmodic action, should be employed in full and reiterated doses. It is quite remarkable how freely opiates may be exhibited with impunity, and with the most beneficial results, in painful affections of this kind. When tonics, on the contrary, are resorted to with a view of obviating a spasmodic tendency, their use must long be persevered in, during the intervals of the attacks. In spasms of the stomach, especially when complicated with biliary derangement, a protracted course of calomel often succeeds in removing the morbid disposition after the failure of all the more ordinary remedies.

Amongst the diseases to which antispasmodics are chiefly applicable, may be enumerated nervous palpitations, asthma, and angina pectoris, hysteria, chorea, epilepsy, tetanus, and hydrophobia, spasm in the stomach, diaphragm, and bladder, cholera, and colic, &c.

℞ Mist. Assafœt. ℨvss.; Tinct. Valer. Ammon. ℨiv. M. Fiat Mistura. Take one-fourth of it every four hours. (In Nervous and Spasmodic Affections, Hysteria, Asthma, &c.)

℞ Mist. Camphoræ ℨv. Spirit. Ammon. Fœtid. ℨv. Syr. Croci ℨiij. M. Fiat Mist. Two tablespoonsful for a dose.

℞ Mist. Camphoræ ℨx. Tinct. Opii. ♏xl. Spirit. Æther. Sulph. ℨj. Syr. Rhœados ℨj. Misce. Fiat Haustus. (In very painful Spasmodic Affections, in Cramp of Stomach, &c.)

℞ Camphoræ, Conf. Rosæ āā Ɵij. Divide in Bolus viij. Take one every four hours. (In Typhus, with muttering delirium and subsultus tendinum.)

℞ Camphoræ, Potassæ Nit. āā Ɵj. Vitelli Ovi q. s. Tere simul; adde Aquæ Flor. Aurant. ℨiv. Tinct. Hyosc. et Tinct. Conii āā ℨj. Fiat Mistura. Take a tablespoonful every three hours. (Chordee.)

℞ Pulv. Valer. Rad. Ɵj. Pulv. Cinnam. Comp. gr. x. M. A powder to be taken every four hours. (In Hysteria, Nervous Headache, &c.)

℞ Pulv. Ipecac. Rad. gr. iv. Sodæ Carb. Exsic. Ɵij. Pulv. Opii. gr. ij. M. Divide in Pulv. iv. One every six hours. (Spasmodic Asthma—Pertussis of adults.)

℞ Opii gr. j. Castorei gr. ix. Pulv. Digit. gr. ij. Pil. Scillæ Comp. gr. viij. Divide in Pil. iv. One three times a day. (Asthma.)

℞ Tinct. Assafœt. ℨij. Tinct. Castor., Tinct. Moschi āā ℨj. Tinct. Opii ♏xxx. Fiat. Mist. ♏xxx in an ounce of mint-water every two hours. (Hysteria.)

℞ Tinct. Castor. ℨj. Æther. Sulph. ♏xx. Tinct. Opii ♏viij. Aquæ Cinnam. ℨjss. Fiat Haustus. To be taken three times a day.

℞ Assafœt. ℨj. Aq. Menth. Pip. ℨvss. Tere optime simul. et. adde Tinct. Valer. Ammon. ℨij. Tinct. Castor. ℨiij. Æther. Sulph. ℨj. M. Fiat Mistura. A tablespoonful every two hours. (In Hysterical Paroxysms.)

℞ Valer. Rad. Pulv. Ɵj. Tinct. Valer. Ammon. Tinct. Castor, āā ℨj. Mist. Camph. ℨjss. M. Fiat Haustus. To be taken three times a day.

℞ Tinct. Opii ♏iij. Vini Ipecac. ℨv. Syr. Tolut. ℨiij. Sodæ Carb. Ɵj. Aquæ Rosæ ℨj. M. Fiat Mistura. A teaspoonful every four hours. (To infants in Hooping-cough, &c.)

℞ Moschi ℨj. Oxid. Zinci ℨss. Extr. Valer. q. s. ut fiat Pil. xxx. Take three pills three times a day. (Epilepsy, &c.)

℞ Moschi Ɵj. Pulv. Acac. ℨss. Tere

simul, et adde gradatim Aquæ Cinnam. ʒx. Æther Sulph. ʒss. M. Fiat Haustus. To be taken as there may be occasion for it.

℞ Mist. Moschi ʒj. Spir. Amm. Arom. ʒij. Tinc. Castor. ʒiv. Syr. Papav. ʒij. Fiat. Mist. Take three tablespoonsful every four hours. (In Hysteria and Convulsive Affections, after purgatives.)

℞ Moschi gr. x. Camphoræ gr. v. Pulv. Opii gr. ss. Cons. Rosæ q. s. ut fiat Bolus.

℞ Castorei Əj. Ammon. Carb. gr. v. Syr. q. s. ut fiat Bolus. (Hysteria.)

℞ Bismuthi Tris-Nitrat. gr. iv. Magnes., Sacch. Purif. āā Əij. Divide in Chart. iv. Take one every three hours. (Dyspepsia.)

℞ Bismuthi Tris-Nitrat. ʒij Muc. Acac. q. s. ut fiat Pil. xxxvi. Take one every two hours. (Gastrodynia.)

℞ Bismuthi Tris-Nitrat. ʒj. Castorei ʒss. Pulv. Trag. Comp. ʒij. M. Divide in Pulv. xij. Take one three times a day. (In Neuralgic Pain of Stomach and Intestines, Pyrosis, Chronic Gastritis, Cramps, Diarrhœa and Vomiting of Spasmodic Cholera. For formulæ for the Nitrate of Silver, the Sulphate and Ammoniuret of Copper, and the Salts of Iron, see TONICS and ASTRINGENTS.)

℞ Tinct. Digit. ♏︎x. Tinct. Calumbæ ʒj. Mist. Camph. ʒj. M. Fiat Haustus. To be taken twice or three times a day. (In Palpitations, with great nervous irritability.)

℞ Assafœt. ʒij. Decoct. Avenæ ʒx. M. Fiat Enema. (In Flatulent Colic.

This and the following ones to be administered tepid. One or two drachms of the aromatic Spirit of Ammonia and half a drachm of Tincture of Opium may occasionally be added.)

℞ Castorei Moschi āā ʒss. Pulv. Acac. ʒij. Tere simul, et adde gradatim Decoct. Hordei ʒviij. Tinct. Opii ♏︎x. M. Fiat Enema. (In Hysteria, Epilepsy, Typhus with subsultus.)

℞ Camph. ʒj. cum guttis quibusdam Spirit. Rectif. in Pulv. redactæ; Vitel. Ovi unius; Decoct. Hordei ʒxiv. M. Fiat Enema. (In the adynamic stage of Fever.)

℞ Olei Tereb. ʒj. Camph. Rosæ Əj. Ol. Oliv. ʒjss. Vitelli. Ovi j. Spirit. Ammon. Fœtid. ʒij. Decoct. Avenæ ʒix. M. Fiat Enema. (Purgative and antispasmodic, in Flatulent Colic, Tympanites, &c.)

℞ Tabaci Fol. Əj. Aquæ Ferv. ʒviij. Macera per horam et cola. Fiat Enema. (In Ileus, Strangulated Hernia, Tetanus, &c.)

℞ Fol. Belladonnæ Exsic. gr. xij. Aquæ Calidæ ʒvj. M. Macera et cola. Sit pro enemate. (In Spasm of the Rectum or Neck of the Bladder.)

℞ Lin. Camph. ʒij. Extr. Opii. Aquos. ʒss. Tere simul. Fiat Embrocatio. (To be rubbed along the spine in Hooping-cough.)

℞ Lin. Camph. Comp. ʒjss. Tinct. Canthar. Əiv. Tinct. Opii ʒiij. M. Fiat Embrocatio. (To be rubbed over the abdomen in Colic, Cramp of Stomach, &c.)

IV. TONICS.

TONICS are medicines, which, when judiciously employed, have the power of invigorating the functions of the body generally. They may be considered somewhat in the light of stimulants, of a slow but comparitively very perma-

nent operation. Their beneficial results are to be sought for rather in their action on the vital principle than in any immediate chemical or mechanical change effected in the solids or fluids. Their influence, in the usual mode of their exhibition, is exerted, in the first instance, on the stomach and subsequently by sympathy, aided in some cases by absorption, on more distant organs. When given in states of debility unaccompanied by any marked inflammatory tendency which should counter-indicate their use, they often display, in a very remarkable degree, their power of strengthening the digestion and circulation, and adding tone to the enfeebled muscular system. When taken imprudently by the strong and healthy, or by those labouring under plethora, with alarming tendency to congestion of the brain and other internal organs, and even in cases where their use is injudiciously prolonged, however suitable it may at first have been, they are capable of inducing eventually debility of the digestive organs and other very disastrous consequences, of which numerous instances presented themselves at the time when the employment of the celebrated Portland powder in the treatment of gouty patients was in vogue.

Tonics are divisible, according to their source, into the vegetable and the mineral. Many of the most influential of the former are possessed of bitter and aromatic principles in various degrees : and it is such which exert the most beneficial effects on the stomach and digestive organs.

It is in convalescence from fever and other acute disorders, and in intermittents, that the most beneficial effects of tonics are witnessed, provided the stomach and bowels be first ascertained to be free from inflammatory action. In nervous affections, as chorea, neuralgia, and a general morbid increase of nervous susceptibility, &c., they are often employed with great advantage, and especially quinine and those of the mineral kind. In inflammation of the chest, of an acute or subacute character, they are on the contrary, decidedly injurious ; and it is only in the more chronic stages of bronchitis, where the mucous secretion is in excess, that we can hope for any good from their use. In hectic they are occasionally resorted to as palliatives. In the advanced stages of rheumatism they are often a valuable resource. In the treatment of typhus fever, in its latter periods, they are important auxiliaries to stimulants ; and those of a more exciting character, such as quinine, or some other preparation of bark with sulphuric acid, cascarilla, cusparia, or serpentaria, are here usually selected.

In all cases where the effects likely to arise from the use of tonics are dubious, and especially where they are about to be administered for the relief of indigestion accompanied by marked irritability of the stomach, or in the course of convalescences where there exists even the slightest suspicion of lingering inflammation, or ulceration in the intestines, their use should be entered on, if at all, with the greatest caution, the mildest kinds, the aromatic and bitter, being first experimentally prescribed, and that in the most moderate doses, and an ascending gradation of strength being subsequently resorted to, if the health is found to improve under their employment. Where it is desirable that they should be absorbed, it is particularly requisite that they should not be given in such a manner as to produce either general or local excitement.

The most useful adjuncts during their exhibition will be found in a somewhat generous diet proportioned to the strength of the digestive organs, together with the cold bath, the enjoyment of pure cool air, regular exercise, assiduous friction of the surface of the body, change of scene, rational amusement, and the indulgence of hopeful feelings.

℞ Infus. Gentian. Comp. ʒiij. Aquæ Cinnam. ʒj. Carb. Sodæ Əij. Pulv. gr. viij. Spirit. Lavand. Comp. ʒij. M. Fiat Mistura. A fourth part to be taken in the morning and at noon. (In Dyspepsia with acidity.)

℞ Infus. Cascar., Infus. Rhei. āā ʒiij.

Aquæ Cinnam. ℥iv. M. Fiat Haustus. To be taken twice a day.

℞ Pul. Rhei ℈j. Pulv. Capsici. Extr. Anthem. āā gr. x. M. Divide in Pil. x. One to be taken every day before dinner.

℞ Pul. Myrrhæ, Pulv. Rhei āā ℈ij. Aloes Spicat., Extr. Tarax. āā ℨss. Olei Anthem. ℥x. M. Divide in Pil. xxx. Two to be taken every night.

℞ Pulv. Rhei, Potass. Sesquicarb. āā ℨj. Pulv. Calumbæ ℨij. Pulv. Arom. ℨss. M. Fifteen grains twice a day.

℞ Pulv. Rhei, Sodæ Carb. Exsic., Extr. Gentian. āā ℨj. Pulv. Zing. ℈j. M. Divide in Pil xl. Take two three times a day.

℞ Infus. Gentian. Comp. Aq. Cinn. āā ℨij. Sodæ Carb. ℨj.; Sodæ Potassio-Tart. ℨj. M. Fiat Mistura. Take two tablespoonsful morning and noon. (Tonic and aperient.)

℞ Infus. Gentian. Comp. ℥ij. Liq. Calcis ℥iijss. Liq. Potass. ℨj. Tinct. Aurant. ℨiij. M. Fiat Mistura. Take three tablespoonsful twice or three times a day. (In Acidity of Stomach.)

℞ Infus. Cascar. ℥vij. Tinct. Cascar., Tinct. Zing. āā ℨiv. M. A stomachic mixture, of which three tablespoonsful are to be taken three times a day. (Dyspepsia with loss of appetite.)

℞ Extr. Tarax. ℨss. Aquæ Menth. Sativ. ℨjss. M. A draught to be taken at noon and in the evening.

℞ Infus. Cuspar. ℨj. Ammon. Carb. gr. v. Conf. Aromat. gr. x. Spirit. Armor. Com. ℨj. M. Fiat Haustus. To be taken three times a day.

℞ Ext. Tarax. gr. x. Infus. Calumbæ ℨj. Sodæ Carb. gr. iv. Tinct. Cardam. Comp. ℨj. Aquæ Pimentæ ℨiij. M. Fiat Haust. To be taken

three times a day. (Dyspepsia, Chronic Hepatic Affections.)

℞ Extract. Gentianæ ℨij. Fellis Bovinæ ℨiij. Pulv. Rhei ℨij. Assafœtidæ ℨj. M. Divide in Pil. cxx. Take two or three, three times a day.

℞ Calumbæ Rad. Incis., Cascar. Cort. Cont. āā ℨj. Aquæ Ferv. ℥vj. Macera per horas duas et cola. Colaturæ adde Tinct. Calumbæ ℨiij. Spir. Ammon. Arom. ℥xxx. Spir. Aurant. ℨij. M. Take a tablespoonful three times a day. (A light tonic in convalescences, after Fever, Dysentery, &c.)

℞ Infus. Cinch., Infus. Rosæ Comp. āā ℥iv. M. Fiat Mistura. Take three tablespoonsful three times a day (In convalescences.)

℞ Pulv. Cinch. ℨij Pulv. Valer. ℨj. M. Divide in Chart. xij. Take one twice a day. (Neuralgia, Hysteria, Hemicrania.)

℞ Decocti Cinch. ℥vij. Confect. Arom. ℨjss. Tinct. Cinch. Comp. ℨj. M. Fiat Mist. Take three tablespoonsful every four hours.

℞ Decoct. Cinch. ℥vjss. Acid. Sulph. Dil. ℨj. Tinct. Cardam Comp., Syr. Aurant. āā ℨvj. M. Fiat Mistura. Take two tablespoonsful three times daily.

℞ Decoct. Cinch. ℥jss. Extr. Cinch. gr. xv. Tinct. Cinch. ℨj. Spir. Ammon. Arom. ℥xxx. M. Fiat Haustus. To be taken every four hours.

℞ Cinch. Lancifol. Cont. ℥ss. Decoque ex aquæ puræ ℥xvj. ad consumpt. dimid., adjectis sub finem Coctionis Serpent. Rad. Cont. ℨij. Cola frigid. et Colaturæ adde Spir. Cinnam. Comp. ℨjss. Acid. Sulph. Dil. ℨjss. M. Fiat Mist. Take four tablespoonsful every four hours. (*Pringle.*)

℞ Pulv. Cinch. ℨss.—ℨj. Pulv. Arom. gr. viij. M. Fiat Pulvis. To be repeated every four hours until four

have been taken. (In Ague, in the intervals.)

℞ Cinch. Cordifol. ℨj. Antim. Potassio-Tart. gr. j. Opii Pulv. gr. j. M. Divide in partes iv. Give one every two hours. (Malignant Intermittents of Italy.)

℞ Quinæ Disulph. gr. iij. Sacch. Albi gr. vij. M. Fiat Pulvis. To be taken every three hours during the intermission. (Ague.)

℞ Quinæ Disulph. Ɖj. Extr. Cinch. gr. xv. M. Divide in Pil. x. Take one every three hours.

℞ Quinæ Disulph. gr. ij. Infus. Rosæ Comp. ℨx. Syr. Aurant. ℨij. M. Fiat Haustus. To be taken every four hours.

℞ Quinæ Disulph. gr. ij. Acid. Sulph. Arom. ♏xvj. Aquæ Distil. ℨjss. Syr. Caryophyll. ℨss. M. Take ℨj. —ℨij. three times a day. (Tonic for very young infants.)

℞ Quinæ Disulph. gr. xviij. Acid. Sulph, Arom. ♏lx. Infus. Aurant. Comp. ℨvj. Tinct. Cinch. Comp., Syr. Zing. āā ℨj. M. Fiat Mistura. Take one or two tablespoonsful every three hours.

℞ Decoct. Cinch. ℨvjss. Acidi Hydrochlor. ℨjss. Mellis ℨjss. M. Fiat Gargarisma. (In Cynanche Maligna.)

℞ Cinch. Pulv. ℨj. Anthemid. Flor. ℨij. Aquæ Oj. decoque ad ℨx. Cola et adde Vini Rubri ℨij. M. Fiat Enema.

℞ Quinæ Disulph. gr. xij. Acid. Sulph. Dil. ♏vj. Tinct. Opii ♏xvj. Aquæ Tepidæ ℨvj. M. Fiat Enema. (Where the state of the stomach does not admit of the exhibition of Quinæ Sulph. in the ordinary way. It may also be employed in the endermic method; two or three grains, mixed with a little starch being applied fresh every fourth or fifth hour to a blistered surface in the epigastric region,—or five or six grains with lard in the form of an ointment. When the

Sulphate of Quinine has been applied alone and unmixed, it has been known to produce troublesome ulcerations.)

℞ Ferri Sulph. ℨss. Sacchari Albi ℨjss. M. Divide in chart. xij. Signetur No. 1.

℞ Sodæ Carb. ℨss. Sacchari Albi ℨjss. M. Divide in chartulas xij. Signetur No. 2. (One of each of these powders is to be separately dissolved in half a glass of water, the solution to be then mixed and drank off immediately. A substitute for natural chalybeate waters.)

℞ Ferri Sesquioxid., Pulv. Calumbæ āā gr. v. M. Fiat. Pulv. To be taken twice a day.

℞ Ferri Sesquioxid, Pulv. Rhei āā ℨj. Pulv. Calumbæ Ɖiv. Zing. Pulv. Ɖij. M. Divide in Pulv. xij. Take one three times a day. (In Tic-douloureux, Chlorosis, &c.)

℞ Ferri Sesquioxid. ℨiij. Pulv. Cinnam. Comp. ℨj. Syr. Aurant. ℨj. M. Fiat Elect. Take a tablespoonful three times a day.

℞ Ferri Sesquioxid. gr. x. Pulv. Valer. ℨss. Syr. Zing. q. s. ut fiat Bolus. To be taken three times a day.

℞ Ferri Sesquioxid. ℨjss. Pulv. Rhei gr. xv. Olei Anthem. ♏v. Extr. Gent. q. s. ut fiant Pilul. xx. Take three morning and noon, drinking immediately after ♏xv. Acid. Sulph. Arom. in a cup of water.

℞ Ferri Sesquioxid. gr. xij. Extr. Cinch. Ɖj. Syr. Zing. q. s. ut fiant Pil. xij. Take two three or four times a day. (Dyspepsia.)

℞ Pulv. Cort. Cinch. ℨj. Ferri Sesquioxid. ℨj. Syr. Zing. q. s. ut fiat Electuarium. A tablespoonful three times a day.

℞ Ferri Potassio-Tart. Ɖij. Syr. Tolut. q. s. Divide in Bolus vj. One three times a day. In Scrofulous Affections, Rickets, debility of the diges-

tive organs, &c. From its taste not being disagreeable children take it readily. A nutritive diet should be conjoined, and the secretions of the intestinal mucous membrane promoted and corrected, if necessary, by Rhubarb, Ipecacuanha, Hydrarg. cum Cretâ, &c.)

℞ Ferri Potassio-Tart. gr. x. Pulv. Calumb. gr. xij. Pulv. Arom. gr. iv. M. Fiat Pulv. To be taken three times a day.

℞ Ferri Ammon. Chlor. ℨj. Extr. Aloes, Extr. Gent. āā ℨss. Contunde simul. Divide in Pil. xxx. Take two three times a day. (Tonic and aperient. In Anæmia, Chlorosis, Scrofula, &c.)

℞ Ferri Sulph. ℨj. Potass. Carb. gr. vj. Myrrhæ ℨj. Pulv. Aloes Comp. ℨss. Contunde simul et divide in Pil. xxx. Take three twice a day. (Tonic and aperient. In Chlorotic Amenorrhœa.)

℞ Infus. Quassiæ ℥jss. Tinct. Calumb. ℨj. Tinct. Ferri Muriat. ♏x. M. Fiat Haustus. To be taken three times a day.

℞ Solutionis Magnesiæ (ope Acidi Carbonici) ℥jss. Tinct. Ferri Mur. ♏x. —xxx. Fiat Haust. To be taken three times a day followed by a cup of cold or tepid water. (A very efficient preparation. In Anæmia, Chlorosis, Nervous palpitations, &c.)

℞ Ferri Sulph. Pulv. Subtiliss, ℨss. Magnesiæ Calcin. Əij. Aquæ ℥vj. Tinct. Quassiæ, ℨij. Rub the magnesia with a very little of the water, and when they are mixed, add the remainder; afterwards add the sulphate and tincture. Rub up again for a little while, and as soon as possible divide into six phials, which are to be immediately corked and sealed. Take one night and morning. (In this formula of Mr. Donovan, the Protoxide is presented in its most soluble and energetic state. Each draught contains about 10 grains of Protoxide, and nearly 29 grains of Sulphate of Magnesia. For delicate stomachs half the above dose will be preferable. It should be prepared fresh every second or third day. The *pilules ferrugineuses* of Vallet are considered by the able chemist to whom we are indebted for the above preparation, to be the next best formula, and superior to the *ferruginous sugar* of Becker and Klauer, in which the Protoxide forms a compound of little solubility. *Griffith's Mixture* and the *Pil. Ferri Comp.* (*Ph. Dub.*), though admitted to be very scientific preparations, are thought by Mr. Donovan to contain too little iron to be effectual. The tonic effects of chalybeates appear, however, in a great proportion of cases to be most satisfactory and permanent where administered in moderate quantities, as well as in a very soluble and dilute form, and where their use is long persevered in, as in the case of ferruginous mineral waters.)

℞ Ferri Cyanidi (Ferri Prussiat.) gr. iij. Syr. Simpl. ℨj. M. Fiat Haust. To be taken three times a day. (In Chorea and Epilepsy; also in Intermittents and Scrofula. The dose may be gradually increased to six grains. Used in the hospitals of America.)

℞ Argenti. Nit. gr. ij. (in Aquæ ♏ ij. solut.) Micæ Panis ℨj. M. optime. Divide in Pil. xvj. One to be taken three times a day. (The bread should be well washed to remove all its free Muriate of Soda, and the Nitrate of Silver rubbed down quickly with a drop or two of distilled water in a glass mortar. The dose may be gradually increased to three or four pills or even a greater number, but its use should be frequently intermitted to avoid gastric irritation and permanent discoloration of the skin. Its use requires great caution in Epilepsy, Angina Pectoris, palpitations connected with Dyspepsia, Gastrodynia, and other Neuralgia.)

℞ Argenti Nit. gr. ij. Ex. Humuli Əj. Extr. Hyosc. gr. xij. Tere optime simul. Divide in Pil. octo.

One three times a day. (In dyspeptic palpitation, Pyrosis, obstinate Leucorrhœa. The dose may be cautiously increased to two or even three pills, but only continued for a few days at a time. In the case of Pyrosis its influence is augmented by the addition of one-eighth of a grain of Opium to each pill. Nitrate of Silver has also been used with good effect in the form of injection in Dysentery, four grains to six ounces of water.

℞ Cupri Ammon. Sulph. gr. xij. Extr. Gent., Pulv. Calumb. āā ℥ss. M. optime. Divide in Pil. xxxvj. Take one twice a day. (Epilepsy, Chorea, &c. after a course of purgatives. The dose may be very cautiously increased to five or six pills at a time and upwards.)

℞ Cupri Sulph. gr. j. Syr. Papav. ℥j. Aquæ Anisi ℥iij. M. Fiat Mistura. A teaspoonful every four hours. (In Hooping-cough. The dose for children above seven years old may be double the above.)

℞ Cupri Sulph. gr. v. Pulv. Rhei ℥ss. Extr. Gent. ℥j. Syr. q. s. M. optime. Divide in Pil. xx. Take one or two twice a day. (Leucorrhœa, Chorea, &c.)

℞ Liq. Arsenic. ℔iv. Decoct. Cinch. ℥x. Syr. Aurant. ℥ij. Tinct. Opii ℔v. M. Fiat Haustus. To be taken twice a day after eating. (In obstinate Agues, inveterate Neuralgic Affections, periodic Headaches, Chronic Rheumatism, and some intractable cutaneous diseases. Its employment requires extreme circumspection, and should never be had recourse to till all milder remedies have failed. The Liquor Arsenicalis has, in some instances, been administered in gradually increased doses to the extent of fifteen or even twenty drops, but it is rarely requisite or even safe to go beyond half the latter quantity. Its use should be immediately suspended as soon as there is the slightest sign of irritation of the stomach, as increased thirst, nausea, anorexia, &c. or acceleration of the pulse, or a prickling sensation and stiffness in the eyelids. It should always be given after a light meal, so as in some degree to protect the mucous membrane.)

℞ Arsen. Protox. gr. j. Piper. Nigri gr. xij. Pulv. Acaciæ gr. ij. Aquæ Distil. q. s. Mix them well, and divide the mass into sixteen pills. (The celebrated Asiatic pill. The Arsenic ought to be very finely powdered and beaten for several hours in an iron mortar along with the Pepper, the gum and water afterwards added. One pill to be taken daily in Lepra Vulgaris, Lepra, Tuberculosa, Lupus, Psoriasis, &c. The dose may sometimes be increased to two pills daily. For the *mineral acids*, see STIMULANTS.)

V. ASTRINGENTS.

ASTRINGENTS are defined, by Cullen, to be " such substances as, when applied to the human body, produce contraction and condensation of the soft solids, and thereby increase their density and cohesion ;" their effects being supposed to take place either immediately by contact, as in the case of their direct application to a part, or of their being subsequently carried to it through the medium of absorption and the circulation ; or else, secondarily, through the intervention of sympathy. But there is every reason to believe that this view

of their operation is too limited, and that they exert a powerful influence imme-diately over the vitality as well as over the chemical and mechanical condition of parts.

The astringent and the tonic principles frequently co-exist in the same sub-stance, in various degrees of respective predominance : the presence of the former often limiting the applications of the latter, and rendering the drug which contains both unsuitable to cases of great irritability of fibre.

Astringents of the vegetable class owe their corrugating influence, for the most part, to the presence of tannin, an element which seems sometimes to dis-play a considerable power in controlling intermittent fever, and often enhances the febrifuge virtue of such tonics as it is naturally combined with.

Of the astringents drawn from the mineral kingdom the most frequently used are the sulphuric acid in a dilute state, alum and lime-water, the salts of iron, zinc, copper, silver, and lead.

This class of medicines manifest a remarkable power of restraining excessive evacuations and hæmorrhages of a passive character. Thus they are often very useful in leucorrhœa, in the latter stages of gonorrhœa and ophthalmia, of pulmonary and vesical catarrh, diarrhœa, and dysentery, after the inflamma-tory symptoms have been reduced by time or suitable treatment, and also in some cases of hæmoptysis, hæmatemesis, melæna, and hæmaturia, as well as of hæmorrhoids when in an indolent state. They are often useful in diabetes, and in cases of inordinate sweating, accompanied by great debility, and in the latter case especially so, if their effects be aided by a moderately cool atmosphere, and by the direction of the fluids internally by the judicious exhibition of aperients and other gentle evacuants tending to substitute a vicarious discharge.

In chronic hoarseness and relaxed sore throat, astringent applications are of decided utility, so likewise in calculous affections and chronic irritation of the urinary organs, in which a great portion of the benefit is probably ascribable to their action on the digestive system. Their use in flabby ulcers and various other morbid conditions of the surface of the body falling under the care of the surgeon, is well established.

In the earlier or more acute stages of inflammation, when the morbid action is already fully established, a recourse to astringent medicines commonly proves decidedly injurious; though there are certainly some exceptional cases, as for instance the ophthalmia neonatorum, connected with the irritation of gonorrhœal matter, in which applications of a very powerful astringent and stimulant nature (as the solution of the nitrate of silver containing from ten to twenty grains to the ounce of the distilled water), when resorted to in the very com-mencement of the disorder, prove most beneficial; so also the use of a similar injection in the earliest period of specific urethral inflammation, care being taken, by pressing upon the passage, that it shall not pass backwards above a couple of inches.

The dangerous consequences of the employment of astringents in the case of critical discharges, or of such as are connected with a gorged state of the blood-vessels, or with some unremoved cause of local irritation, as, for example, irri-tating matters in the bowels, are indubitable.

The well-known power of opium in controlling the secretions and excretions, by diminishing the activity of nearly all the functions of the body, renders it a valuable auxiliary to astringents in many cases of profuse discharges, as like-wise in many species of hæmorrhage, especially when preceded or accompanied by such remedies as tend to depress the circulation, as venesection, aperients, nauseants, digitalis, and the judicious employment of cold, both externally and internally.

Of the metallic astringents two of the most energetic, and which have of late years been considerably employed, are the diacetate of lead and the sulphate of copper.   The former is one of the most powerful agents we possess for con-

trolling internal hæmorrhages; and any injurious consequences which might otherwise arise from its use may generally be obviated by its combination with opium: and the free use of drinks acidulated with vinegar, to prevent the risk of the formation of the poisonous carbonate, is said to promote still further the safety of its exhibition. In the treatment of Asiatic cholera it has been strongly recommended upon high authority. In cases of obstinate diarrhœa and dysentery the sulphate of copper, united with opium, has been found in judicious hands a safe and very effectual remedy.

℞ Pulv. Alum. gr. x. Pulv. Kino gr. v. Confect. Rosæ ℨj. M. For a Bolus—to be taken every six hours. (In internal passive Hæmorrhages, Diabetes, Leucorrhœa, and Chronic Diarrhœa.)

℞ Lactis Vaccinæ Bullientis ℔j. Alum. Contr. ℨij. Boil them together until they coagulate. Strain off the liquid, of which a cupful may be taken from time to time.

℞ Infus. Rosæ Comp. ℨjss. Acid. Sulph. Dil. ♏xv. Syr. ℨj. M. For a draught, to be repeated every four hours. (Internal Hæmorrhages.)

℞ Infus. Cascar ℨvj. Pulv. Kino Comp. ℨj. Syr. Papav. ℨiv. For a mixture, of which take two tablespoonsful every six hours. (Chronic Diarrhœa.)

℞ Infus. Caspar. ℨj. Tinct. Catechu ℨj. Pulv. Ipecac. gr. x. M. For a draught. (In internal Hæmorrhages. Ipecacuanha, in scruple doses at distant intervals, or three or four grains every second hour, has been found very effectual in checking Hæmorrhage from the stomach or bowels as well as from the uterus and lungs.)

℞ Pulv. Ipecac. ℨj. Aquæ ℨxij. Decoque ad ℨvj. Take four tablespoosful every six hours. (Chronic Dysentery.)

℞ Pulv. Ipecac. gr. jss. Alum. gr. vj. Syr. Papav. q. s. For a Bolus, to be repeated every four or six hours. (Chronic Dysentery.)

℞ Pulv. Rhei ℨss. Pulv. Opii gr. ij. Pulv. Aromatic gr. xij. M. Divide in Pulv. vj. Take one every four hours. (In Mercurial Dysentery, &c.)

℞ Mist. Cretæ ℨjss. Tinct. Opii ♏x. Tinct. Catechu ℨj. M. For a draught, to be taken every three hours, or after every liquid stool. (Diarrhœa. See also NARCOTICS.)

℞ Pulv. Ipecac. Com. gr. xij. Pulv. Arom. gr. viij. M. Divide in Pulv. iv. Take one every third hour. (Diarrhœa and Dysentery.)

℞ Catechu Extr. Pulv. gr. xv. Pulv. Cretæ Comp. cum Opio Ͽj. M. For a powder, to be taken every four hours. (In Diarrhœa unaccompanied by inflammatory symptoms.)

℞ Extr. Hæmatox. gr. xv. Tinct. Krameriæ Rhataniæ ℨj. Aquæ Cinnam. ℨxv. M. For a draught, to be taken every fourth hour. (In the latter stages of Diarrhœa and Dysentery.)

℞ Krameriæ Rhataniæ Rad. ℨss. Aquæ ℔ij. Decoque ad ℔jss. Cola. Take three tablespoonsful every third hour.

℞ Extr. Krameriæ ℨj. Aquæ Rosæ ℨiv. Syr. Papav. ℨj. For a mixture. Take one tablespoonful every second hour.

℞ Granati Baccæ Court. ℨss. Lactis Vaccini Recentissimi ℔iv. M. Decoque ad ℔ij. Take three table spoonsful every three hours. (Chronic Diarrhœa. A Spanish remedy of great efficacy, especially in cases when ordinary astringents are too irritating. When milk disagrees, it may be made with water and sweet-

ened with Liquorice-root. It may also be used as an enema.)

℞ Pulv. Nucis Vomicæ ʒj. Aquæ ʒviij. M. Decoque ad ʒvj. Adde Tinct. Opii ♏lx. For a mixture; of which take a heaping tablespoonful every two hours. (In Dysentery. The influence of Nux Vomica in Dysentery is attested by Hagestrom, Hufeland, Richter, Geddings, &c. It may also be given in the form of pills, three to six grains thrice a day.)

℞ Extract. Nucis Vomicæ gr. viij.—xvj. Mucilag. Acaciæ ʒj. Aquæ Distil. ʒvj. Syrupi Altheæ ʒj. M. For a mixture. Take half an ounce every two hours. (Dysentery. Its use should not be long persevered in, if it fails to give early relief.)

℞ Ol. Tereb. ♏xv. Aquæ Menth. Pip. ʒj. M. For a draught: to be repeated every four hours. (In internal passive Hæmorrhages.)

℞ Tinct. Ferri Mur. (Sesquichlorid.) ♏x. Aquæ ʒj. M. For a draught: to be taken every third hour. (In uterine and vesical Hæmorrhages.)

℞ Zinci Sulph. gr. xij. Myrrhæ Pulv. Ɖij. Conf. Rosæ v. s. ut fiant Pil. xij. Take one three times a day. (In Phthisis or Chronic Bronchitis with excessive expectoration, in Leucorrhœa and Nervous Affections.)

℞ Plumb. Acet., Opii āā gr. vj. Pulv. Sacch. Ɖij. M. Divide in Pulveres. xij. Take one night and morning. (In Colliquative Diarrhœa, and sweating of Phthisis. A glass of barley-water slightly acidified with simple Oxymel may be taken after it, to prevent the formation of the carbonate.)

℞ Plumb. Acet. gr. iv.—xij. Aquæ Distil. ʒiij. Acid. Acet. Dil. ʒij. Aceti Opii ♏xi. Syr. Papav. ʒv. For a mixture. Take one tablespoonful every third hour. (In Hæmorrhages from the stomach and intestines, uterus and urinary organs, and lungs.)

℞ Acet. Plumb. Ɖj. Opii gr. j.—ij. Pulv. Glycyr. gr. xij. Muc. Acac. q. s. ut fiant Pil. xij. Take one every hour. (In the premonitory Diarrhœa of Asiatic Cholera. If the characteristic vomiting, purging, and spasms already exist, give them every quarter of an hour till relief is obtained, and then gradually increase the intervals at which the dose is given to every third or sixth hour.)

℞ Cupri Sulph. gr. ss. Opii gr. ss. Conf. Rosæ q. s. For a pill: to be taken three times a day. (In Chronic Diarrhœa or Dysentery. The dose of the Sulphate may be gradually raised to two grains at a time, to be taken immediately after food, so as to diminish the risk of irritation of the mucous membrane.)

℞ Alum. Sulph. ʒj. Decoct. Cinch. ʒxij. Mellis Rosæ ʒjss. M. For a gargle. (In relaxation of the uvula and fauces.)

℞ Infus. Krameriæ Rad. ʒvij. Acid. Sulph. Dil. ʒij. Syr. Rosæ Gall. ʒj. For a gargle, to be used with the assistance of a glass tube. (In relaxation of the uvula. For other gargles, see STIMULANTS and TONICS.)

℞ Alum. Sulph. gr. viij.—xvj. Aquæ Rosæ ʒiv. M. For a Collyrium. (In chronic stage of Ophthalmia.)

℞ Aquæ Rosæ ʒvj. Zinci Sulph. gr. xij. M. For a Collyrium.

℞ Liq. Plumb. Diacetat. ♏iv.—viij. Aquæ Distil. ʒiv. M. For a Collyrium.

℞ Liq. Plumb. Diacetat. ʒss. Ung. Cetac. ʒj. M. For an ointment. (In Ophthalmia Tarsi.)

℞ Liquor. Plumb. Diacetat. Ɖj.—ij. Aquæ Rosæ ʒviij. Vini Opii ʒj. M. For a Collyrium. (In scrofulous inflammation of the eyelids.)

℞ Plumb. Acetat. gr. xij. Suberis Usti gr. iv. Butyri Recentis ʒj. M. For an ointment. (Hæmorrhoids.)

℞ Pulv. Gallarum ʒj. Opii Pulv. gr. xv. Adipis Suillæ ʒj. M. For an ointment. (Hæmorrhoids.)

℞ Aquæ Calcis ʒj. Olei Olivæ ʒij. Camphoræ ʒij. M. For a Liniment. (In superficial inflammations, burns,&c.)

℞ Aluminis Sulphat. ʒj. Aquæ ʒviij M. For a lotion. (Hæmorrhoids when free from inflammation)

℞ Cort. Gallarum ʒss. Aquæ ʒxviij. M. Decoque ad ʒxvj. For an injection into the vagina.

VI. DIAPHORETICS.

DIAPHORETICS are medicines by which the cutaneous exhalation is increased; those by which copious sweating is produced are called *Sudorifics.* Medicines of this kind act either by stimulating the exhalants of the skin, or else by augmenting the force of the circulation generally, or by both these ways at once. Of the first we have examples in the influence of saline diaphoretics, and in that of the large ingestion of aqueous fluids : of the second, in the effects of stimulant diaphoretics, alcoholic liquors, and violent exercise. Tepid diluents and external warmth seem at once to augment the vigour of the circulation, and to relax the mouths of the exhalant vessels. Emetics and nauseants have also a great tendency to relax the cutaneous surface.

Diaphoretics prove beneficial in most acute and chronic disorders by determining to the skin, and perhaps also, (though in a very inferior degree, in consequence of the quantity of drinks, which are generally simultaneously swallowed,) by diminishing the quantity of circulating fluids, and thus in both these ways relieving such internal organs as may be the seat of inflammation or of congestion. Their good effects are particularly well seen in cases where the urinary or alvine excretions are in excess; as also where the mucous membrane or the parenchyma of the lungs is in a congested state, and where the pulmonary secretion is superabundant. Their sanative influence, and especially that of the well-known Dover's powder, in diarrhœa and dysentery, is one of the best established facts in therapeutics. When the powder just named tends to produce vomiting, this may generally be obviated by administering it in the form of a pill along with some bitter extract, as that of gentian, for example. Diaphoretics afford a very effectual means of lowering the pulse, and bringing back a healthy condition of the surface, in febrile disorders when unaccompanied by symptoms of a low or typhoid type. To catarrhal and rheumatic fevers they are peculiarly applicable. It is only, however, in the very commencement of fevers that diaphoretics, like emetics, can have any chance of cutting short their progress; and even here, those of a heating kind should generally be avoided. Besides their other modes of action already alluded to, the evaporation from the skin, which follows the operation of a diaphoretic, has a great effect in lowering the temperature.

In the scaly and some other forms of cutaneous eruptions their employment is often followed by very satisfactory results, especially when accompanied by the use of the warm bath or vapour bath in their simple or medicated form; so likewise in diabetis, the body being kept at the same time habitually warmly clothed, and flannel worn next the skin. In dropsy, gout, and secondary syphilis they are often had recourse to with advantage.

In the phlegmasiæ and fevers, and especially when the symptoms of inflammation run high, not only should those of an exciting nature be avoided, but venesection and aperients should be premised in order, in some degree, to cool the surface and relieve the over-distended and imperfectly acting capillaries. The body should be sufficiently, but yet moderately covered, so as to guard against the influence of cool air, without, at the same time, over-exciting the

superficial vessels, and so producing a state incompatible with the free exercise of the secerning function. The exhibition of stimulant diaphoretics, whilst the body is perhaps at the same time kept heated with a profusion of bedclothes, tends to the production of typhoid symptoms and miliary eruptions.

When it is desirable that sweating should be long sustained, wearing a flannel dress next the skin to absorb the moisture and prevent the risk of sudden cooling, is a useful precaution. Bathing the feet in hot water, or assiduously fomenting them with cloths wrung out of the same, form, together with a copious supply of tepid diluents, the best auxiliaries to diaphoretic medicines.

Opium and calomel constitute, in many cases, very valuable adjuncts to several medicines of this class, and especially to ipecacuanha and to antimony. Acidulated drinks should be avoided for some time after a dose of an antimonial diaphoretic has been swallowed, lest vomiting should unnecessarily be induced. Aperients should, of course, scarcely ever be exhibited simultaneously with sweating medicines, both because their effect is in some degree of a contrary nature, tending to impede the action of the latter, as well as because if diaphoresis were to take place, the exposure of the body in the act of getting up to stool might give rise to dangerous consequences. The use of cold drinks should be avoided, after once the perspiration has begun to flow. The action of the skin being most easily excited during the night and towards morning, these are the periods usually selected for the promotion of artificial perspiration. When sweating has already continued as long as it is desirable, it may generally be checked with safety by wiping the body hastily with flannel cloths, and substituting a fresh supply of well-aired garments and bed-coverings, and gradually exposing the hands and arms to the air.

As in health, so likewise in some chronic diseases, as habitual dyspepsia, for example, active exercise and friction are the best modes of increasing the action of the cutaneous vessels, and so relieving the internal organs. Copious draughts of water, either cold or hot, are often sufficient to excite very profuse sweating without the aid of any more strictly medical agent. Cold affusion is a safe and useful appliance in cases of high fever attended by a firm and frequent pulse, and a hot and dry skin, tending, in a very striking manner, to reduce the violence of the circulation, and to promote perspiration, if the patient be quickly dried and covered up after its use, and adequately supplied with diluent drinks. In the more advanced stages of fever, or where the pulse is somewhat feeble, tepid affusion, or rather sponging, should alone be resorted to, and even these are inadmissible where the skin is moist and relaxed, and the heat not well developed. Cold affusion is inadmissible, even in febrile states, if internal inflammation exist, as well as in advanced pregnancy and during menstruation.

By violent exercise, as well as by the exhibition of diaphoretics, the expected access of an ague fit has been prevented in some instances, and its stages have been moderated in others.

Partial perspirations in fever, the pulse at the same time keeping up, are by no means indicative of an improvement in the case, but rather the reverse.

℞ Potass. Nit. gr. xv. Pulv. Acac. gr. x. Mist. Amyg. ℨij. M. For a draught, to be repeated every four hours. (Acute Rheumatism. Tepid diluents to be at the same time freely administered.)

℞ Potass. Nit. gr. v. Liq. Ammon. Acet. ℨij. Aquæ Menthæ Pulegii ℨv. Vini Antim. Potassio-Tart. ℳxx. Muc. Acac., Syr. āā ℨj. M. For a draught, to be repeated every fourth hour. (In inflammatory diseases to relax the skin and reduce the pulse. A few drops of Tinct. Digitalis (ℳ iij. —vj.) may occasionally be added with advantage.)

℞ Potass. Nit. gr. xij. Pulv. Ipecac. gr. jss. M. Divide in Pulv. vj. Take one every third hour. (A diaphoretic in early infancy.)

℞ Potass. Carb. gr. xviij. Suc. Lim.

℥iv. Aquæ Distil. ℥j. Sacch. Albi
Əj. M. For a draught, to be repeated
every three hours. (When inflam-
mation runs high xx.—xxx. drops of
Antimonial Wine may be added to
each dose.)

℞ Ammon. Sesquicarb. Əj. Aquæ ℥jss.
Syr. ℥j. M. For a draught, with a
table-spoonful of lemon juice: to be
repeated every four hours.

℞ Spir. Ætheris Nit. ℨiij. Vini Ipecac.
℥j. Mist. Camphoræ ℥v. Syr. Simp.
℥iv. M. For a mixture. Take two
tablespoonsful every three or four
hours.

℞ Liq. Ammon. Acet. ℥iij. Mist.
Camph. ℥j. Syrup. Aurant. ℥j. M.
For a draught, to be repeated every
four hours. (One of the mildest and
most effectual diaphoretics. A few
drops of Antimonial Wine, or Wine
of Ipecacuanha may occasionally be
added, where inflammatory symp-
toms prevail; or the Aromatic Spirit
of Ammonia, if there be much de-
pression.)

℞ Pulv. Antim. gr. xij. Pulv. Trag.
Comp. Əij. M. optime. Divide in
Pulv. iv. Take one every fourth hour.
(In Inflammatory Affections after ape-
rients.)

℞ Pulv. Ipecac. Comp. gr. vj. Liq. Am-
mon. Acet. ℥iij. Pulv. Acac. gr. x.
Aquæ Cinnam, ℥ix. M. For a draught,
to be repeated every six hours. (Rheu-
matism, &c.)

℞ Pulv. Ipecac. Comp. gr. xij. Conf.
Arom. q. s. A piece to be taken at
bed-time. (Dysentery, Diarrhœa,
Rheumatism, &c. Some time after
the bolus is taken, tepid diluents
should be used freely.)

℞ Pulv. Jacobi Veri gr. viij. Pulv. Ipe-
cac. Comp. gr. xvj. Conf. Arom. q.
s. ut fiant Pil. viij. Take two every
three hours.

℞ Antimon. Potassio-Tart. gr. ss. Hydr.

Proto-Chlor. gr. iv. Opii gr. ij. Conf.
Rosæ q. s. Misce optime. Divide
in Pil. ij. Take one at bed-time.
(Acute Rheumatism.)

℞ Tinct. Guiaci Ammon. ℥j. Pulv.
Trag. gr. xv. Aquæ Cinnam. ℥jss.
M. A draught, to be taken three
times a day. (Chronic Rheuma-
tism.)

℞ Guiaci Gummi Res. gr. x. Pulv.
Ipecac. Comp. gr. v. Potass. Nit.
gr. x. Conf. Rosæ q. s. A bolus,
to be taken at bed-time.

℞ Mist. Camphoræ ℥vss. Tinct. Guiac.
Ammon. ℥vj. Liq. Ammon. Acet.
℥j. Acet. Opii ℥j. Syr. Aurant.
℥v. A mixture, of which one table-
spoonful is to be taken three or four
times a day. (Dysmenorrhœa.)

℞ Extr. Aconiti gr. j. Extr. Anthem.
gr. xj. Antimon. Sulphureti Præcip.
(Oxysulphureti) gr. iv. M. optime.
Divide in Pil. iv. Take one every
night and morning. (In obstinate
Chronic Rheumatism, &c. Requires
caution.)

℞ Mist. Camphoræ ℥j. Vini Colchici
℥ss. Liq. Ammon. Acet. ℥ij. M.
A draught, to be repeated every six
hours. (Gout and Rheumatism.)

℞ Rad. Sarsapar. Concis. ℥iv. Glycyr.
℥ss. Liq. Calcis Oij. M. Macera
per horas xxiv. in vase vitreo optime
opere lato, et in loco frigido et ob-
scuro, dein cola. Take ℥iv. three or
four times a day. (In secondary
Syphilis, mercurial affections, de-
bility and impairment of the general
health, Scrofula, and Chronic In-
flammation of the Bladder. Its use
should be continued for several
weeks.)

℞ Rad. Sarsap. Conci. ℥ij. Aquæ
Bull. ℥viij. Stet per horas 24. Cola
et adde Liq. Potass. ℥j.—ij. Extr.
Glycyr. ℥j. M. Take four table-
spoonsful three times a day. (Scro-
fula, &c.)

VII. EXPECTORANTS.

EXPECTORANTS are medicines by which the excretion from the respiratory organs is promoted. Emetics. nauseants, many stimulants, and some antispas-modics have this tendency. The operation of expectorating medicines is gene-rally somewhat complex, but may, in great part, be resolved into the altering of the quantity of the secreted matter, and the facilitation of its expulsion. The latter object may be effected either by inducing some change in the quality of the pulmonary and tracheal secretions (diminishing the viscid nature of the sputa when excessively glutinous and adhesive, or, on the other hand, aug-menting their consistency when unnaturally thin, serous, and frothy), or by stimulating the action of the muscles which co-operate in the act of expec-toration, or by both these ways simultaneously. In some states of the respi-ratory organs, antiphlogistics, diaphoretics, counter-irritants, and other reme-dies by which the excessive action of the pulmonary capillaries is reduced to the secreting point, are the true expectorants. In others where there is an excessive flow of mucus, impaired aeration of the blood, and a consequent deficiency of nervous and muscular energy, emetics are often very useful in getting rid of the superabundant quantity of fluid already poured out, by means of exciting the vehement action of the expiratory muscles, and thus compressing and emptying all the bronchial ramifications. In these cases too, the stimulating expectorants, such as squill and seneka combined with ammonia, the balsams, myrrh, and the other gum resins, often prove most effectual, along with such measures as tend to sustain the strength, and to alter the mode of action of the vessels by which the mucus is secreted. Of the beneficial effects of both these modes of treatment, when well timed, we may have ample evidence in the management of the suffocative catarrh of the aged, the peripneumonia notha of the older writers.

In pneumonia itself, in its advanced stage, where accompanied by predomi-nant typhoid symptoms, and where it is considered advisable to endeavour to effect a crisis through the medium of expectoration, the stimulant expectorants, such as seneka, are most commonly preferred. In acute and chronic bron-chitis and humid asthma, the nauseating expectorants, such as fractional doses of ipecacuanha or of the tartrate of antimony, are amongst our most valued resources, and may be combined, in many instances, with augmented efficacy, with opiates, antispasmodics, and mercurials. Such combinations tend much to allay irritation, and to relax spasmodic constriction in the air-tubes, as well as in the minute vessels by which their coats are lined. In asthma of a ner-vous character, and in that of cardiac origin in its advanced stage, expecto-rants of a depressing kind are often altogether unsuitable, inasmuch as they tend still further to lower the vital energy which is already at too low an ebb.

In infancy, emetics answer particularly well as a means of relieving bron-chial inflammation, and their use is attended with much less distress than in after life. In phthisis, likewise, they often prove useful palliatives, discharging rapidly a large quantity of secreted mucus, and for a time diminishing the irri-tation within the lung.

The list of stimulants affords, as we have seen, numerous agents of much topical efficacy in modifying the action of the pulmonary exhalants, such as turpentine and tar vapour, chlorine and iodine; but of all these it may be stated generally, that their influence cannot fail to be highly injurious when-ever they produce much excitement. Here watery vapour, either simple or very slightly medicated, as by aromatics, vinegar, tincture of opium, &c., will commonly be much more appropriate.

During the administration of expectorants, a moderate action of the skin should be maintained by means of adequate clothing, lest an oppressive determination of blood to the lungs should defeat their object ; whilst, at the same time, all strong diuretics and purgatives should be abstained from, as calculated to impress a false direction on the circulating fluid, or, to speak more correctly, to produce an inconsistent irritation or excitement in an antagonist organ.

℞ Mist. Amyg. ʒvj. Vini Ipecac., Potass. Carb. āā ʒjss. M. Take two tablespoonsful, with one of Lemon juice (during the effervescence) every third hour.

℞ Vini Ipecac. ʒi. Syr. Simp. ʒjss. M. A mixture : of which give the child a teaspoonful, whenever the cough is severe. (The syrup of Squills may occasionally be substituted for, or added to the Wine of Ipecacuanha.)

℞ Mist. Amyg. Amar. ʒvij. Vini Ipecac., Aceti Scillæ āā ʒjss. Syr. Tolut. ʒv. A mixture. A tablespoonful to be taken if the cough be violent.

℞ Potass. Nit. Ɲj. Pulv. Ipecac. gr. vj. Myrrhæ gr. xij. M. Divide in Pulv. iv. Take one every fourth hour.

℞ Pulv. Ipecac. gr. xij. Calomelanos gr. iv. Conf. Rosæ q. s. Divide in Pil. viij. Take one every fourth or sixth hour. (In acute and extensive Bronchitis accompanied by considerable fever.)

℞ Pulv. Ipecac., Calomelanos āā gr. v. Sacch. Albi gr. x. M. Divide in Pulv. xx. Take one every third hour. (In extensive Bronchitis and Pneumonia of very young infants.)

℞ Aquæ Menthæ ʒj. Muc. Acac. ʒss. Liq. Antim. Potassio-Tart. ʒi.—ij. Syr. Limon. ʒij. Tinct. Opii ♏ij. M. A mixture. Take from one to two teaspoonsful every two hours. (In the Pneumonia of very young subjects.)

℞ Extr. Conii ʒss. Pulv. Scillæ gr. x. Pulv. Ipecac. gr. v. M. Divide in Pil. x. æquales. Take one two or three times a day.

℞ Pulv. Ipecac. gr. xij. Aceti Distil. ʒxij. Aquæ Menthæ Pulegii ʒijss. A mixture. Take two tablespoonsful every four hours. (Asthma.)

℞ Amygdal. Amar. Contrit. ʒj. Potass. Nit. ʒss. Pulv. Ipec. Ɲj. Extr. Glycyr. et Muc. Acac. āā q. s. ut fiant Trochisci xxx. Take one every two or three hours. (Bronchitis.)

℞ Extr. Opii Aquos, gr. x. Pulv. Ipec. gr. x. Extr. Glycyr. ʒiv. Sacchari Albi ʒiv. Muc. Trag. q. s. Divide in Trochiscos octoginta. Take one more or less frequently during the day, according to the violence of the cough. (In the latter stages of Bronchitis. Very useful.)

℞ Sodæ Carb. ʒss. Vini Ipecac. ʒj. Tinct. Opii ♏x. Syr. Tolut. ʒiij. Aquæ ʒjss. A mixture; of which a tablespoonful may be taken every four hours.

℞ Tinct. Scillæ ♏xv. Acid. Nit. Dil. ♏xv. Extr. Hyosc. gr. iij. Aquæ ʒjss. M. Fiat Haust. A draught to be taken every third or fourth hour, until the fourth repetition. (Asthma.)

℞ Lobeliæ Inflatæ ʒx. Spir. Ten. ʒviij. M. Digere per dies decem et cola. Of this Tincture take from ♏x. to xl. in gradually increasing doses. (Expectorant, diuretic, and antispasmodic. In Asthma, Hooping-cough, and Croup. In larger doses (ʒj.—ʒij.) it is emetic; and dangerously narcotic in excessive doses.)

℞ Oxymel. Scillæ ʒv. Tinct. Camph. Co. ʒiij. Spir. Æther. Nit. ʒiv. Infus. Lini Comp. ʒvjss. A mixture. Take two tablespoonsful every third hour.

℞ Mist. Ammoniaci ʒvj. Acet. Scillæ

℥iv. Vini Ipecac. ℨij. Tinct. Opii ♏xl. Aquæ Fœnic ℥x. A mixture. Take two teaspoonsful every third hour. (Chronic Catarrh. If there be great depression of strength, a drachm of the Carbonate of Ammonia may be added to the mixture, and the Tincture of Squill ℨij. substituted for the Vinegar of Squill.)

℞ Mist. Camphoræ ℨiv. Tinct. Digit. ♏x. Oxymel. Scillæ ℨss. M. A draught to be taken every four hours. (Chronic Bronchitis grafted on Morbus Cordis.)

℞ Mist. Assaf. ℨiij. Aq. Menthæ Pip. ℨij. Tinct. Scillæ ℨij. Tinct. Camphoræ Comp. ℨij. Syr. Tolut. ℨiv. M. A mixture. Take one tablespoonful every three hours.

℞ Myrrhæ Gum. Res. ℨj. Scillæ Pulv. Ɖj. Gum. Res. Ammoniaci ℨss. Ammon. ℨss. Extr. Hyosc. Ɖij. Muc. Acac. q. s. M. Divide in Pil. xl. Take two three times a day. (Phthisis and Chronic Catarrh.)

℞ Assafœt. Ɖj. Pulv. Ipecac. ℨss. Scillæ Pulv. gr. viij. Sap Duri. Syr. Tolut. āā q. s. ut fiant Pil. xvj. Take

one every four hours. (Chronic Catarrh of the aged, Asthma.)

℞ Pulv. Scillæ, Extr. Conii āā ℨss. Ammoniaci Gum. Res. ℨjss. M. optime. Divide in Pil. xxx. Take one every fourth hour.

℞ Mist. Ammoniaci ℨiv. Vini Antim. Potassio-tart. ℨiij. Tinct. Camph. Comp. ℨv. Syr. Tolut. ℨj. M. A mixture. Take a dessert-spoonful when the cough is violent.

℞ Decoct. Senegæ ℨvj. Ammoniaci ℨij. Syr. Tolut. ℨvj. M. A mixture. Take two tablespoonsful four times a day. (In Pectoral Affections with debility and excessive secretion of mucus.)

℞ Decoct. Senegæ ℨj. Liq. Am. Acet. ℨss. Syr. Scillæ ℨij. Syr. Papav. ℨij. M. Take ℨi.—ii. every three hours. (For very young infants in the advanced stages of Pertussis and Chronic Bronchitis.)

℞ Mellis, Olei Amyg. āā ℨj. Suc. Limon. ℨiv. Syr. Tolut., Syr. Scillæ āā ℨij. M. For a linctus. (In common Catarrh.)

VIII. EMETICS.

EMETICS are medicines which have a peculiar tendency to excite vomiting in almost all cases, even when given in very moderate doses. There are many other medicines which being of a disagreeable flavour are occasionally rejected by irritable stomachs, or if they are swallowed in considerable quantity ; but these are intentionally excluded by the above definition. There is, in fact, scarcely any substance, however simple, which if taken to excess will not cause an inverted action of the stomach. Bitters, when taken largely, approach most nearly in their effects to special emetics. A strong tepid infusion of chamomile rarely fails to turn the stomach, and a weak one swallowed liberally is one of the most usual means resorted to for promoting the action of the class of medicines now under consideration. Tepid water and most other tepid fluids taken rapidly, and in unusually large quantities, are by their sickly flavour and the distension they cause commonly alone sufficient to induce vomiting.

A few minutes after an emetic has been administered, nausea and a peculiar sinking sensation come on, accompanied by paleness, quickness and weakness of pulse, and chilliness, and all this is speedily succeeded by the free evacuation of the stomach, and the establishment of a certain degree of reaction in the system. During the efforts of vomiting, the face is flushed and turgid from the mechanical obstruction to the return of blood from the head. Considerable

languor and drowsiness usually succeed to the operation of such medicines ; and hence the evening is generally to be preferred for their exhibition : the skin is left in a relaxed and perspiring state, and the pulse for the most part continues, for some time after, feebler than it was before, and any inflammatory symptoms which may have existed, are somewhat diminished in intensity.

Where the vomiting induced is severe, the irritation often extends to the hepatic ducts and liver, and a profuse flow of bile makes its way into the stomach, and comes up along with its other contents, of which an abundant secretion of ropy mucus is commonly a conspicuous one. By this sudden secretion of bile, and the consequent distension of the biliary ducts, as well as by the vehement compression of the abdominal organs, and the general tendency to relaxation, large impacted biliary calculi have sometimes been liberated.

The degree of nausea induced by a medicine is not always proportionate to its emetic influence. Thus the sensation of sickness which ensues upon the use of the sulphate of zinc is very much less oppressive than that caused by the tartrate of antimony, or by tobacco. In quickness of operation also emetics differ very remarkably : thus the sulphates of zinc or of copper act almost immediately ; the tartrate of antimony requires a somewhat longer time : and ipecacuanha longer still, though even this, when the medicine is given in an adequate dose, rarely much exceeds a quarter of an hour ; but in certain cases, as for instance after poisons have been swallowed, even the difference of a few minutes is of great practical importance.

There is a great difference in individuals in regard to the facility with which vomiting is excited, and this exists in a still greater degree in respect to different classes of animals, in some of which, from the structure of their stomachs, this action can scarcely, if at all, be induced, as in the horse for example. In persons labouring under mental derangement, much stronger doses than ordinary are commonly required.

Many stimulant substances, when freely swallowed, have an emetic tendency, of which we have a conspicuous instance in the infusion of mustard-seed, which is capable of exciting the stomach to action, even when great general and local torpidity exists. Most irritant poisons give rise to severe vomiting. Narcotics on the other hand, if not rejected almost immediately after they have been taken, diminish in a remarkable degree the sensibility of the stomach.

Several emetics, as ipecacuanha, tartrate of antimony, &c., have also a purgative tendency, so that even if they fail of fulfilling the original intention of their exhibition, they often prove useful by acting on the bowels.

To their utility in promoting diaphoresis and expectoration we have already called the reader's attention in the preceding class ; they have also a marked influence over the process of absorption, their use having in some instances been almost immediately followed by the disappearance of dropsical effusions, of indolent buboes, and various morbid deposits.

Nauseant medicines, and especially ipecacuanha, are often given, and with great success, for checking internal hæmorrhages, such for example as those from the stomach and intestines, kidneys, bladder, uterus, &c.

On the well established antiphlogistic efficacy of the tartrate of antimony in pneumonia and acute rheumatism, ophthalmia, and various other inflammatory affections, when given in large doses (as one or two grains in small quantity of a weak aromatic infusion, repeated every two or three hours, drinks being withheld in the mean time, in order to diminish the chance of its expending its operation on the stomach or bowels), we shall not here dwell, as its beneficial influence does not seem to be by any means necessarily connected with its occasional emetic effect.

Amongst the most common cases in which the action of emetics is called for, are those where the stomach is oppressed by food of indigestible quality, or taken in excessive quantity—intoxication, when there is reason to apprehend that the alcoholic liquors which have caused it have not been fully expelled by

the spontaneous vomiting which so commonly ensues—poisoning by acrid or narcotic substances—periodic and bilious headaches—fever in its commencement, to cut short its progress—and ague just before or during the cold stage, to break through the concatenation of morbid actions, and to restore the balance of the circulation—cynanche tonsillaris in its inflammatory stage as well as when abscess has taken place, in which it often affords immediate relief— obstinate diarrhœa—incipient cholera, to act as a general stimulant to the system and to drive the blood more equally through all the vessels, and so equalize the circulation and overcome local congestion—bronchitis, especially if accompanied with excessive mucous secretion, as well as phthisis and asthma.   In several of these cases, a great part of the good effect seems attributable to a species of counter-irritant action on a sound portion of the gastro-intestinal mucous membrane.

In infancy emetics are particularly well borne, and prove very effectual in relieving the chest in bronchitic inflammation, hooping-cough, croup, &c. Their use should generally be avoided in diseases of the heart and great vessels, especially in their advanced stage; in cases where a tendency to congestion of the head exists; in hernia; prolapsus of the rectum and uterus; and in the latter months of pregnancy.   When there is a very irritable state of the stomach their employment is obviously counter-indicated, as well as in chronic disorders as in fevers; their imprudent administration in such cases often lays the foundation of formidable gastro-enteritic inflammation.   The habit of taking them very frequently under almost any circumstances, has a tendency to render the stomach very susceptible, and impatient even of many of the ordinary forms of aliment, and to debilitate both it and the system at large.

When vomiting takes place to excess, it may often be effectually checked by the exhibition of an effervescing draught, an opiate, a couple of drops of the dilute hydrocyanic acid or of creosote in a potion, or by a dose of magnesia combined with aromatics and stimulants.

℞ Pulv. Ipecac. Əj.   Aquæ Menthæ Pulegii ℨjss.   M.   For a draught, which must be immediately followed by a cupful of tepid water, or of a tepid infusion of Chamomile.

℞ Antim. Potassio-tart. gr. ij.   Aquæ Distil. ℨiv.   A mixture, of which two tablespoonsful must be taken every fifteen minutes until vomiting occurs.

℞ Pulv. Ipecac. gr. xv.   Vini Antim. Potassio-tart. ℨij.   Aquæ Menth. Sativ. ℨjss.   M.   A draught to be taken immediately.

℞ Vini Ipecac. ℨss.   Syr. Simp. ℨss. Aquæ ℨj.   M.   Take one teaspoonful every fifteen minutes, until an emesis is produced.   (A mild emetic for very young infants.   When a more depressing emetic is advisable, the Tartrate of Antimony, in doses of from $\frac{1}{16}$ to $\frac{1}{8}$ of a grain, may be added to each dose.)

℞ Aquæ Distil. ℨj.   Vini Ipecac. ℨss. Liq. Antim. Potassio-tart. ℨij.   Syr. Scillæ ℨij.   M.   A mixture.   One teaspoonful may be taken frequently until vomiting comes on.   (Emetic for very young infants in Croup, &c.)

℞ Pulv. Ipecac. g. xij.   Aceti Scillæ ℨij.   Aquæ Menth. Pulegii ℨx.   M. A draught.

℞ Sinapis Pulv. ℨss.   Aquæ Tepid. ℨxij.   M.   One half to be taken immediately, and the remainder after the lapse of fifteen minutes, if it seems necessary.   (In cases of diminished sensibility of the stomach, or of general debility, where the depressing effects of ordinary emetics are likely to prove injurious, as in Paralysis, Cholera, cases of poisoning by narcotics, &c.)

℞ Zinc. Sulph. Əj.   Conf. Rosæ Can. q. s.   A Bolus: to be taken immedi-

ately. (Applicable to cases where rapid operation of the emetic is desirable, without extreme or long continued nausea, as in Ague, poisoning, &c.)

℞ Cupri Sulph. gr. viij. Aquæ Distil. ℨij. M. An emetic draught. (In cases of poisoning by Opium and other narcotics, when the common emetics have failed to excite the stomach to action, and when the stomach-pump is not at hand.)

℞ Ammon. Carb. Əj. Pulv. Ipecac. ʒss. Tinct. Capsici ʒij. Aquæ Menthæ Pip. ℨiij. M. A draught to be taken immediately. (In cases similar to those last mentioned, of greatly impaired sensibility of stomach and nervous system.—N. B. The *stomach-pump* in the great majority of such cases, as well as in dangerous intoxication by ardent spirits, when vomiting has not taken place spontaneously, is a most valuable resource, superseding the necessity of recurring to the employment of these violently irritating emetics.)

℞ Tabaci Fol. ʒj. Aquæ Tepidæ q. s. Contunde simul. A poultice, to be applied to the Epigastrium. (Requires caution; must be removed instantly on the supervention of sickness.)

IX. CATHARTICS.

CATHARTICS, or purgatives, are medicines which promote the alvine evacuations; those which are very violent in their operation being called drastics, or, from their producing large watery stools, hydragogue cathartics; whilst those of a peculiarly mild action are termed aperients or laxatives.

The effects of purgatives are ascribable partly to their augmenting the secretions from the mucous follicles and exhalants opening upon the inner surface of the intestines, as well as those from the liver and pancreas, and partly to their stimulating the muscular fibres of the bowels to increased peristaltic action. Different kinds of purgatives produce these effects in very different relative proportions, some increasing greatly the liquid secretions, whilst others seem to do little more than propel the fæcal matter already existing in the intestinal tube, only very slightly augmenting, at the same time, the quantity of bile and mucus. Calomel and blue pill again promote the action of the liver in a very marked manner, as do likewise, though in an inferior degree, rhubarb and colchicum. Some purgatives, as has been already stated in our preliminary remarks on the art of prescribing, exert their influence chiefly on the upper portion of the bowels, and others on the lower; whilst a third set, such as the saline aperients, senna, and castor oil, seem to act on the whole length of the intestinal canal pretty equably.

There are still some other important points of difference amongst purgatives, as, for instance, in regard to the time required for their operation, and the degree of sickness, uneasiness, or pain, which they cause, as well as in respect to the amount of general excitement or irritation in the system which follows their use. Of the several untoward results to which their injudicious employment occasionally gives rise, the most conspicuous are those connected with the incautious exhibition of the strongest kinds, such as calomel, scammony, and colocynth, gamboge, colchicum, croton oil, and elaterium.

The cases in which purgatives are most frequently resorted to are those in which irritating matters are retained in the intestines, or where the habitual alvine discharges are tardy or insufficient, or unnaturally altered in quality. In inflammatory and congestive disorders, in active sanguineous and serous effusions, and in general plethora, they constitute most valuable auxiliaries to

other antiphlogistic or depletory and counter-irritant remedies. In fevers, where the secretions are deficient or depraved, they are commonly very freely exhibited in the earlier stages before debility has set in ; but, like all other useful remedies, they are very liable to abuse, and since the publication of Dr. Hamilton's valuable work they have, in fact, too often been pushed to extravagant lengths by his less judicious disciples in the treatment of such low fevers as are characterized by predominant alvine irritation or inflammation, and especially as regards their too liberal exhibition towards the close of such disorders.

During the course and after the subsidence of some of the exanthemata, a pretty free recourse to cathartic medicines is generally advisable : so likewise in chorea and hysteria and several other nervous and spasmodic affections, where the alvine evacuations are in a morbid state, as is so often the case. In the treatment of mania, purgatives were long trusted to as the sheet anchor, and though it is now well known that their importance was overrated, they are still acknowledged to be very valuable auxiliaries. The disorders, in short, in which this class of remedies has been at one time or other confidently recommended and largely employed, are almost commensurate with the entire list of the nosologist. They have been loudly praised in jaundice, gout, rheumatism, neuralgic affections, and habitual headache, in purpura and cutaneous diseases, in chlorosis and amenorrhœa, in verminous affections, colic from lead and other causes, obstructions of the bowels, liver, &c., and even in dysentery : in these and a vast number of other diseases which we have not space to enumerate, they have been very commonly resorted to in these countries with great boldness and frequent success. There is, however, every reason to believe, that those practitioners who hold a middle course between the excessive and indiscriminate employment of purgatives, towards which the popular prejudice in Great Britain tends, and the timid and too restricted use of them for which our continental neighbours have latterly been notorious, effect at once the greatest amount of good and the least mischief, and are, consequently, the most worthy of imitation. In indigestion, in particular, the abuse of cathartics amongst us has been carried to a fearful length, the sensibility of the mucous membrane being thus frequently almost exhausted, and the nervous system kept in a miserable state of alternate excitement and depression by their diurnal and exaggerated employment. Many a case of dyspepsia and sluggishness of bowels, which diet, exercise, and time, would have gradually subdued, is thus deeply aggravated, and rendered permanent for life, by an impatient and irrational recourse to the daily and unwarrantable irritation of the stomach and bowels by violent drastics ; and doubtless, in not a few instances, an inflammatory and even an ulcerated condition of the mucous membrane have been the result, together with exasperated hæmorrhoids, and painful prolapsus of the bowel. The vulgar notion that the enjoyment of health is impossible where there are not one or more alvine evacuations daily, has given rise to a greater amount of suffering in England than perhaps any other erroneous medical idea of our day. The natural habit of different individuals differs *ab origine* in respect to the frequency with which their bowels ought to be moved, and any attempt to compel all under the same standard, cannot fail to be productive of disagreeable consequences. The temporary stimulus which a purgative imparts to the system, is often mistaken for the feelings of health, and contributes not a little to the perpetuation of the erroneous practice. Thus Lord Byron was tempted to have very frequent recourse to saline aperients, from finding that their operation was followed by an immediate though evanescent rise of spirits, superior to that caused by any vinous stimulant. As long as a person feels well, the mere interruption of the alvine evacuations for a day or two should by no means be considered as invariably affording grounds for the exhibition of opening medicine. By waiting, and trusting to the efforts of nature, and the effects of food of a more laxative quality, the bowels will generally return to their duty very speedily, provided a habit of undue purgation has not already been formed ; and even then, recourse for a

few weeks to some natural saline mineral water of happy composition, though perhaps of feeble ingredients when taken separately, will often re-establish the muscular tone and secretory power of these parts.

In weakly patients, and pregnant and menstruating females, violent purgation is peculiarly inappropriate; in passive dropsies likewise the employment of energetic cathartics requires great circumspection: in hydrothorax in particular, occurring in the aged or debilitated, they are rarely if ever admissible, and have appeared in some instances decidedly to accelerate the fatal termination; and even in those cases of dropsy of the cellular membrane or abdomen, where drastics or hydragogues are called for, they should not be uninterruptedly administered, and the strength will often require to be supported under their use by tonics and stimulants and a light but nutritious diet. When a tendency to hæmorrhoids exists, aloetic purgatives, from their proneness to cause irritation of the lower bowels, are generally improper, and should give way to aperients of the mildest description, such as castor oil in gradually decreasing doses, or olive oil, sulphur, and cream of tartar, or some of the saline mineral waters. In dysentery too, where aperients are required, none but those of the gentlest kind should be ventured on. As to the purgative effects of oil of turpentine, the error of supposing them very violent was till of late years common, and it is now well known to be a medicine of great value and mild operation, especially when given in pretty full doses along with castor oil, or even with sweet oil, by the mouth or in injections, and to be peculiarly serviceable in those cases of low fever where the evacuations are very fetid and unnatural, and meteorism exists, as well as in spasmodic affections, colic, melæna, and worms. From its stimulant nature it is often admissible in cases of fever, where great sinking precludes the use of more debilitating aperients.

Of the methods best suited for correcting the irritating and sickening tendency of some purgatives, we have already spoken in our preliminary remarks. Those of a very potent nature should rarely be given, save in divided doses repeated at moderate intervals, and for the most part are much the better for being united with others of a milder and somewhat dissimilar operation. Calomel or blue pill forms a useful adjunct to many, when only occasionally had recourse to, as they both possess a great power of correcting unhealthy secretions, and are peculiarly applicable where the tongue is white and slimy, the conjunctiva of a yellowish tinge, and the skin arid and discoloured: at the same time, against the habitual use of mercury as an aperient, whether in the diseases of infancy or of adult age, we can scarcely warn the young practitioner too strongly. When our object is to lower excitement and to diminish the quantity of blood circulating in the system, the regular employment of the saline aperients is the most appropriate and least permanently debilitating.

The state perhaps of all others in which the use of purgatives is the most unexceptionable and productive of the most certain relief, is that where, along with an unusual feeling of anorexia, the tongue, broad, flabby, and without redness of its point or borders, is loaded with a white or brownish fur, the abdomen distended but free from acute pain even on pressure, and the urine of a muddy or bilious appearance.

It is not always possible to fix on the precise dose most suitable to a given case, even in respect to the mildest and most used aperients; and, generally speaking, their operation can be most satisfactorily adapted to the object we have in view by administering them in divided doses, at intervals of from two to six hours. When purgation is necessary, and yet the patient is incapable of swallowing, as in apoplexy and the comatose state induced by narcotic poisons, &c., a drop of croton oil placed on the tongue will often suffice to open the bowels most effectually, or the stomach-pump or enemata may be had recourse to.

In very obstinate obstruction of the bowels, purgatives may sometimes be rendered effectual by combination with narcotics, by premising venesection,

dashing cold water on the extremities, by giving mercury to salivation, or by the cautious use of tobacco in the form of enemata, or of fomentation, or finally by the employment of the exhausting syringe introduced into the rectum. Where enemata are had recourse to, in such cases, they ought to be of large size and very active ingredients. An emulsion containing turpentine, castor oil, and assafœtida, is often very effectual. We are frequently obliged to employ injections in cases of habitual constipation, where the stomach will not bear, or appears to be weakened by the use of aperients ; but the diurnal use of the former is scarcely less to be deprecated than that of the latter, and will at length almost invariably disappoint us. In cases of permanent or mechanical obstruction in the rectum, however, they constitute a valuable resource.

An attempt is here made to group them according to their respective energy. The same purgative, however, it must be remembered, acts with a very different degree of force on different individuals, and even on the same individual under different circumstances.

1. *The stronger Purgatives.*

℞ Pulv. Jalap. gr. x.   Calomelanos gr. v. Pulv. Arom. gr. ij. M. A powder to be taken immediately.

℞ Hydr. Chloridi Mit. gr. ij.   Pulv. Scam. gr. iij.   Sacch. gr. ij.   Pulv. Zing. gr. ij.   M.   A powder.

℞ Pulv. Rhei gr. xv.   Calomelanos gr. iij. Pulv. Zing. gr. ij. M. A powder.

℞ Pulv. Jalap. gr. xij.   Potassæ Bitart. ʒss.   Pulv. Arom. gr. ij.   M.   A powder.

℞ Calomelanos gr. iij.   Pulv. Scam. Comp. gr. x.   M.   A powder, to be taken twice a week.   (In Worms and morbid state of the intestinal secretions ; incipient Hydrocephalus, &c.)

℞ Infus. Sennæ Comp. ℥v.   Potass. Tart. ʒj.   Tinct. Sennæ, Tinct. Jalap. āā ʒiv.   Syr. Rhamni ʒiij. M.   Take one-fourth part immediately, and repeat the dose every fifteen minutes, until a free alvine evacuation is obtained.

℞ Hydrarg. Submur. gr. v.   Pulv. Antim. āā gr. iv.   Extr. Papav. gr. iij.   M.   Divide in Pil. ij.   To be taken at bed-time.   (In this and the preceding formulæ we have used the three synonymes of Calomel promiscuously, as the prescriber ought to be familiar with each.*)

℞ Hydr. Chlor. Mit. gr. iij.   Pulv. Jacobi Veri. gr. iij.   Extr. Col. Comp. gr. iv.   Extr. Hyosc. gr. ij.   M.   Divide in Pil. ij.   To be taken at one dose.

℞ Pulv. Jalap. gr. x.   Pulv. Rhei gr. v.   Calomelanos gr. iij.   Pulv. Cinnam. Comp. gr. ij.   M.   A powder.

℞ Pulv. Jalap., Potass. Tart. āā gr. xv. Sacch. ʒj.   Olei Caryoph. ♏ij.   M. A powder to be taken in a cup of orange-flower water.

℞ Sodæ Sulph. ʒss.   Antim. Potassio-tart. gr. j.   Aquæ ʒiv.   M.   An Emetico-cathartic draught.

℞ Sennæ Fol. ʒss.   Aquæ Ferventis ℔j.   Macera et cola.   Adde Sodæ Sulph. ℥ss.   Vini Antim., Potassio-tart. ʒj. M.   An Enema.   (In Painter's Colic.)

℞ Vini Colchici Sem. ʒij.   Magn. Carb. ʒj.   Aquæ Cinnam. ℥iij.   A mixture, of which take a tablespoonful every three hours.   (In Gout, an aperient pill having been previously administered.)

℞ Acet. Colch. ʒss. Magn. Calcin. ϶iv. Magn. Sulph. ʒvj.   Syr. Croci ʒss. Aquæ Menthæ Vir. ℥v.   M.   A mixture, of which take a fourth part every six hours.   (Use as in the preceding.)

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* We protest against all synonymes for Calomel : if this word be used, no mistakes can occur.

℞ Vin. Colch. Cormi ℳxxx. Potassæ Sulph. ℥jss. Sodæ Carb. Ɖij. Aquæ Anethi ℥jss. Tinct. Calumbæ ℥jss. M. To be taken while effervescing in a tablespoonful of Lemon juice.

℞ Ol. Croton. Tiglii ℳij. Muc. Acac., Syr. āā ℥j. M. A mixture. Take a fourth part, every four hours until the effect is obtained.

℞ Ol. Crot. Tig. ℳij. Micæ Panis gr. viij. Misce optime. Divide in Pil. ij. Take one immediately, and repeat it after six hours, if necessary.

℞ Hydr. Chloridi gr. xij. Pil. Cambog. Comp., Extr. Coloc. Comp. āā gr. xv. Syr. Zing. q. s. M. Fiat Pil. xij. Take two at bed-time pro re natâ. (In obstinate Costiveness.)

℞ Cambog. Contr. gr. ij.—iij. Sacch. Purif. Ɖj. Tere optime simul. A powder to be taken every third hour, until a full alvine evacuation is obtained. (In Dropsy. Requires caution.)

℞ Pil. Cambog. Comp. Pil. Rhei Co. āā Ɖj. Pulv. Scam. gr. xvj. Extr. Jalapæ, Extr. Coloc. Comp. āā gr. xij. Ol. Carui q. s. M. Divide in Pil. xxij. Take two or three at bed-time, and the next morning take two or three tablespoonsful of the following mixture :—

℞ Decoct. Aloes Comp. ℥jss. Infus. Sennæ Comp. ℥ij. Tinct. Sennæ Comp., Tinct. Jalapæ āā ℥iv. M. A mixture. (In obstinate torpor of the bowels after milder purgatives have lost their influence.)

℞ Elaterii gr. vj. Cambogiæ gr. x. Extr. Aloes Spic., Sagapeni āā gr. xij. Ol. Carui q. s. Fiat Massa in Pil. xij. dividend. Take two every six hours. (In similar cases to the preceding. Such violent drastics can rarely, if ever, be habitually requisite in respect to constipation alone, if there be a due management of diet, air, and exercise. Where the sensibility of the mucous membrane of the intestines has been temporarily exhausted by imprudent purgation, the constipation which ensues is a natural consequence, calling not for renewed excitement, but for temporary repose, to allow time for the parts to recover their susceptibility to the ordinary stimulus of food and drink.)

℞ Elaterii Extracti gr. ij. Mastiches, Extr. Glycyr. āā gr. vj. Misce optime, et divide in Pil. iv. equales. Take one every night. (In dropsical affections, to bring away large watery evacuations. The use of Elaterium requires extreme circumspection.)

℞ Elaterii Extr. gr. j. Pulv. Zing. Ɖss. Ol. Junip. ℳiij. Syr. Rhamni q. s. A bolus. (In Anasarca, &c. after other remedies have failed.)

℞ Extr. Elaterii gr. j. Calomelanos gr. xij. Pulv. Zing. ℈ss. Sacch. Ɖij. Tere optime simul et divide in Chartulas xij. Take one three times a day. (To children of six years old and upwards affected with Dropsy after Scarlatina, milder remedies having failed.)

2. *Milder Purgatives.*

℞ Pulv. Rhei Ɖj. Conf. Arom. gr. x. Aquæ Menthæ Pip. ℥jss. M. A draught.

℞ Magn. Sulph. ℥vj. Infus. Rosæ Comp. ℥iv. Syr. Zingiberis ℥iij. M. Take half immediately, and the remainder after the lapse of two hours.

℞ Pulv. Rhei gr. xv. Potass. Sulph. Ɖj. Aquæ Menthæ Pip. ℥jss. M. A draught.

℞ Pil. Hydrarg. Ɖj. Extr. Coloc. Comp. ℈ss. M. Divide in Pil. x. Take one every other night, or pro re natâ.

℞ Hydr. Chloridi gr. ij. Extr. Coloc. Comp. gr. vi. M. Divide in Pil. ij. To be taken immediately.

℞ Pulv. Rhei, Pulv. Jalapæ āā gr. v. Calomelanos gr. ij. M. A powder: to be taken at bed-time: and the next morning take three tablespoonsful of the following mixture, to be repeated every three hours until the bowels are freely evacuated.

℞ Infus. Sennæ Comp. ʒv. Magnesiæ Sulphat. ʒj. Tinct. Sennæ, Tinct. Jalapæ, Syrupi Zingib. āā ʒiij. M. A mixture. (The Black Draught of most hospitals, given in divided doses, some hours after an aperient pill, powder, or bolus, to accelerate their operation, in the commencement of many inflammatory affections, &c.)

℞ Extr. Coloc. Comp. ʒss. Pil. Aloes cum Myrrhâ Əij. M. Divide in Pil. xvj. Take two pro re natâ. (This and the two following formulæ are suitable to cases of habitual constipation; a state which is however, in the great majority of instances, artificially induced by the abuse of purgatives, injudicious diet, or deficient exercise; and which will often cease spontaneously, on resolutely abstaining for some days from the accustomed aperient.)

℞ Pil. Rhei Comp. ʒj. Pulv. Scam. ʒss. Pulv. Zing. gr. x. Ol. Caryoph. ♍iv. Theriacæ q. s. M. Divide in Pil. xxiv. Take one or two pro re natâ.

℞ Extr. Coloc. Comp., Castorei āā ʒj. Carb. Sodæ Sic. Əj. Ol. Carui ♍vij. Saponis q. s. ut fiant Pil. xxx. Take two or three twice a week.

℞ Extr. Coloc. Co., Pil. Rhei Co. āā ʒss. Calomelanos gr. xij. Ol. Carui ♍v. Syr. q. s. Fiat Massa. Divide in Pil. xv. Take one to three at bed-time. (In commencement of febrile affections, or in habitual costiveness, the Calomel being in the latter case for the most part excluded.)

℞ Pil. Rhei Comp. ʒj. Pil. Hydr. gr. vij. Ol. Cinnam. ♍iv. Divide in Pil. xiv. Take two at bed-time.

℞ Aloes Extr. Spic. Əij. Myrrhæ ʒj. Extr. Gent., Ferri Sulph. āā ʒss. M. Divide in Pil. xxxvi. Take two night and morning. (A tonic aperient in Chlorosis, Anæmia, Dyspepsia, &c.)

℞ Pulv. Rhei gr. vj. Potass. Bitart. gr. xij. Pulv. Cinnam. Comp. gr. iij. Sacch. Əj. M. A powder. (A gentle purgative for children.)

℞ Extr. Coloc. Comp. ʒss. Opii gr. j. M. Divide in Pil. vj. Take one every other hour until the effect is obtained. (In Ileus.)

℞ Olei Ricini ʒvj. Tinct. Sennæ Co. ʒiij. M. A draught. (In Colic and Dysentery. A few drops of Tincture of Opium may be added with advantage in many cases.)

℞ Olei Tereb., Olei Ricini āā ʒiij. Olei Cajeputi ♍vj. Magn . Calcin Əj. Aquæ Menth. Pip. ʒjss. A draught. (In Typhoid Fevers, to correct the morbid state of the alvine secretions and combat Tympanites.)

℞ Extr. Coloc. Comp. gr. xvj. Pil. Hydr. gr. vj. Extr. Hyosc. gr. viij. Pulv. Capsici gr. ij. M. Divide in Pil. vj. Take one or two at bedtime pro re natâ.

℞ Elect. Sennæ ʒss. Pulv. Jalapæ Comp., Pulv. Rhei āā ʒj. Syr. Simp. q. s. An electuary, of which take a teaspoonful at bed-time pro re natâ.

℞ Extr. Aloes Spic. gr. xx. Pulv. Ipec. gr. viij. Pulv. Zing. ʒss. Syr. Simp. q. s. ut fiant Pil. xvj. Take one at noon.

℞ Infus. Sennæ Comp., Aquæ Pimentæ āā ʒvj. Potass. Tart. Əiv. Tinct. Jalapæ, Syr. Aurant. āā ʒj. M. An aperient draught.

℞ Magn. Sulph. ʒss. Mannæ ʒij. In-

fus. Sennæ ℥vj. Tinct. Sennæ ℥ij. Aquæ Menthæ Vir. ℥j. Aquæ Distil. ℥ij. M. A mixture. Take three tablespoonsful every morning, and repeat the dose, if necessary, after four hours. (*Abernethy.*)

℞ Magn. Sulph., Sodæ Sulph. āā ℥ss. Aquæ Menthæ Vir. ℥vijss. Vini Antim. Potassio-tart. ℥j. M. A mixture; take three tablespoonsful three times a day.

℞ Magnes. Sulph. ℥j. Antim. Potassio-tart. gr. ss. Aquæ Oij. M. Take a cupful (℥iv.) every hour until an evacuation is obtained.

℞ Potass. Bitart. ℥ij. Antim. Potassio-tart. gr. j. Aquæ Oij. M. Take a cupful every two hours. (Erysipelas.)

℞ Infus. Sennæ Comp. ℥iij. Infus. Gent. Comp. ℥ijss. Liq. Potass. ℥jss. Tinct. Card. Comp. ℥ijss. M. A mixture. Take two tablespoonsful three times a day. (Aperient and stomachic.)

℞ Olei Tereb., Olei Ricini āā ℥v. A draught. (In Puerperal Fever, Tympanites, Worms, Hysteria, &c.)

℞ Infus. Sennæ Co. ℥iv. Aquæ Carui ℥ij. Tart. Potass. ℥ij. Mannæ ℥j. M. A mixture, of which take a tablespoonful every three hours until the effect is obtained. (Aperient for young infants. *Maunsell and Evanson.*)

℞ Mannæ ℥ss. Muc. Acaciæ ℥ss. Syr. Violæ ℥ij. Aquæ Menth. ℥j. M. A mixture. Take one or two teaspoonsful every third hour. (For infants in the early months.)

℞ Pulv. Rhei gr. xij. Magnes. Ɖij. Pulv. Cinnam. gr. vj. M. Divide in Pulv. xij. Take one every three hours. (Aperient for an infant under the half year.)

℞ Pulv. Rhei. gr. xij. Hydr. cum Cretâ gr. vj. Pulv. Arom. gr. ij. M. Divide in Pulv. vj. Take one every third hour. (In Diarrhœa of young infants, with stools of an unnatural appearance.)

℞ Pulv. Scam., Pulv. Rhei, Potass. Sulph. āā gr. x. Pulv. Arom. gr. vj. Tere optime simul. Divide in Pulv. vj. Take one every fourth hour until the bowels be fully opened. (For young children. Operates mildly.)

℞ Fol. Sennæ ℥ss. Sodæ Sulph. ℥j. Aquæ Ferv. Oj. Infunde per semihoram et cola. An enema.

℞ Olei Tereb. ℥vj. Vitelli Ovi q. s. Infus. Lini ℥x. M. An enema.

℞ Colocynth. Pulp. ℥j. Adipis Præp. ℥j. M. An ointment to be rubbed upon the abdomen.

3. *Gentle Aperients or Laxatives.*

℞ Pulv. Rhei ℥j. Magnes. Calcin. ℥iv. Pulv. Zing. ℥ij. M. Take one teaspoonful pro re natâ in one ounce of Peppermint water.

℞ Pruni Domesticæ ℔ss. Sennæ Fol. ℥j. Caryophyl. Contus. ℥ss. Sacch. brunei ℥j. Aquæ Ferv. Oij. M. Macera per horas ij. Cola. Take ℥iv. every three hours until an effect is produced.

℞ Conf. Sennæ ℥j. Sulph. Loti ℥iv.

Syr. Tolut. q. s. ut fiat Elect. Take two or three teaspoonsful every morning and repeat the dose every three hours until an evacuation occurs. (Hæmorrhoids.)

℞ Potass. Bitart. ℥j. Magn. Carb., Flor. Sulph. āā ℥iv. Potass. Nit. ℥j. M. Divide in Pulv. viij. Take one in a little honey every night and morning.

℞ Potass. Bitart. ℥ss. Sulph. ℥j. Con-

fect. Piper. Nigri ℨij. Olei Carui ♏vj. Theriacæ ℨiij. M. Fiat Electuarium. Take one teaspoonful twice a day. (In Hæmorrhoids.)

℞ Sodæ Potassio-tart. gr. xiv. Rhei Pulv. gr. vj. M. Divide in Pulv. duos. Take one every morning. (An aperient for infants. The Sulphate of Potass, a favourite remedy of Fordyce, Butter, Pemberton, &c. in Infantile Remittent, may occasionally be substituted advantageously for the Rochelle Salt in the above.)

℞ Cassiæ Fistulæ Pulpæ, Mannæ, Olei Amyg. āā ℨij. Aquæ Flor. Aurant. ℨij. M. An Electuary. Take a tablespoonful every hour until the bowels are opened.

℞ Mannæ ℨj. Potass. Bitart. ℨss. Seri Lactis ℥vj. M. Take one half immediately, and the remainder after two hours have elapsed.

℞ Olei Amyg. ℨj. Syr. Simp. ℨij. Vitelli Ovi q. s. M. An Emulsion. To be taken immediately.

℞ Cassiæ Fistulæ ℨj. Caryophyl. Contus. ℈j. Aquæ Ferv. ℥xij. M. Take a fourth part every two hours until a mild operation is induced.

℞ Tamarind. Pulp. ℨij. Aquæ Ferv. ℔ij. Macerate for fifteen hours, and use as a common drink. (In inflammatory affections, where a gentle aperient effect is required, Manna, or Cassia Fistula, or Senna, may be added to it if necessary.)

℞ Tamarind. Pulpæ ℥jss. Pulv. Rhei

ℨj. Potass. Supertart. ℨij. Ol. Carui ♏vj. Syr. Rosæ q. s. An Electuary. Take one teaspoonful pro re natâ.

℞ Pulv. Rhei ℨss. Pulv. Ipecac. gr. vj. Pulv. Zing. gr. xij. Extr. Gent. q. s. M. Divide in Pil. xij. Take two one hour before dinner, or at bed-time.

℞ Pulv. Rhei. Hydr. cum Creta āā gr. xij. Pulv. Ipecac. gr. ij. M. Divide in Pulv. iv. Take one every other night. (Alterative aperient for young infants.)

℞ Olei Ricini ℨiv. Muc. Acac. ℨiij. Aquæ Pimentæ ℨiv. Syr. Tolut. ℨj. Tinct. Opii ♏vj. M. A draught to be taken every four hours, until the bowels are opened. (Lead Colic, Dysentery, &c.)

℞ Sodæ Potassio-Tart. ℨij. Sodæ Sesquicarb. ℈j. Aquæ ℥ij. M. A draught, to be taken with a tablespoonful of Lemon juice during effervescence.

℞ Sol. Magn. (in aquâ ope Acidi Carbonici) ℥vj.; Syr. Rosæ ℨvj. M. A mixture. Take four tablespoonsful with one of Lemon juice during the effervescence, and repeat the dose every four hours, until an evacuation is induced.

℞ Conf. Sennæ ℨjss. Ferri Tart. ℈ij. Syr. Zing. ℨiij. M. An Electuary. Take one or two teaspoonsful at bedtime. (Mild aperient and tonic combined.)

℞ Sodii Chloridi (salis communis) ℥ss. Decoct. Avenæ ℥x. Olei Olivæ ℨij. M. A domestic injection.

X. DIURETICS.

Including not only such medicines as increase the flow of urine, but also those which tend to subdue irritation or chronic inflammation in the kidneys and bladder.

DIURETICS are medicines by which the flow of the urine is augmented. This effect may originate in several different ways, viz., either by the direct action of these substances on the organs by which this fluid is secreted; by their

influence on the stomach and bowels and its sympathetic transference to the kidneys ; and finally by an impression made on the brain and nervous system, of the possibility of which mode of acting artificially on the urinary organs we have collateral proof in the effects of fear and other depressing passions, as well as in that of hysteria and some other nervous disorders, on the kind and quantity of the renal secretion.

That several substances, and especially those of a saline kind, as nitre for example, and some of an organic nature, as the odorous principle in asparagus and mint, the colouring matter in rhubarb, as also turpentine and cantharides, actually reach the kidneys, we have satisfactory proof; and in respect to such it is probable that when they increase the urinary secretion, this may be in great part ascribed to their direct stimulant action on the nerves and capillaries of the secreting organ. The effect of others again is so rapid, that coupling this with the circumstance of their never yet having been detected in the urine, we are led to suppose that they produce their diuretic effect by either the second or third of the ways above alluded to.

Aqueous fluids, taken largely whilst the surface of the body is kept cool, generally act as diuretics : hence it appears how erroneous was the practice of certain of the older physicians, who prohibited the free use of drinks in dropsies. The saline diuretics in particular, if diluents be withheld, would generally irritate the kidneys to a pitch quite incompatible with secretion. If the dose of a diuretic be so large as to produce intestinal irritation, its specific effect on the kidneys is commonly quite lost, of which we have examples in cases where the nitrate of potass, cream of tartar, or turpentine, are given in considerable quantity.

The action of diuretics is often greatly promoted by the previous employment of antiphlogistics to reduce any inflammatory tendency existing in the organs to which they are particularly directed, or in the system generally. Of the influence of general excitement over the urinary secretion, we have a remarkable evidence in the succession of changes which it displays in the course of common fevers. There is however an opposite state of the system, in which it is to the removal of depression and debility by means of bitters, mineral acids, steel, and other tonics, that we must look for the restoration of the due action of the kidneys, no less than that of the other secreting organs.

Where serous effusions exist in large quantity, any medicines which favour their absorption, and thus bring a sudden accession to the watery portion of the blood, are apt to act as diuretics : hence, probably, in part arises the conspicuous influence of calomel and of blue pill in augmenting the effects of squills and some other agents of a similar nature, though it may also be in a considerable measure ascribed to the stimulation of the minute capillaries and nerves of the kidney, whilst in some cases the cessation of the dropsical symptoms must be attributed to the beneficial changes wrought in inflammatory and organic affections of the heart, liver, and other internal organs.

Of the saline diuretics, though some, as we have seen, reach the kidneys unaltered, others, particularly some of those containing vegetable acid, undergo decomposition in the primæ viæ, and appear to act chiefly by means of their alkaline bases.

The principal employment of diuretics is in the treatment of the different varieties of dropsy, with the exclusion of the encysted kind, in which they are almost invariably useless and even prejudicial. They are often admissible in cases where the strength is already too far reduced to justify us in venturing on the use of drastic purgatives. The best period for their exhibition is in the daytime, as the rest is thus not interfered with, and the patient should be encouraged, strength permitting, to sit up and keep himself rather lightly clothed, in order to prevent them from expending their influence on the skin ; and purgatives should, for the time, be withheld. If diuretics be exhibited in the course of fever, a disease in which the urine is often retained or suppressed, the state of the bladder ought daily to be ascertained, as, from the loss of power

of emptying itself, and inconsciousness of its condition on the part of the patient, great and very injurious accumulation of this fluid occasionally takes place. In the inflammatory dropsical effusions which sometimes ensue upon scarlatina, active antiphlogistic measures, as free venesection and purging, are generally much more decisive in their effects than diuretics. It is probable that diuretics are capable of more extensive application in practice than is commonly apprehended. In veterinary practice they are made much use of, and with excellent results, in combating pulmonary and other internal inflammations, as well as for the purpose of getting the animal speedily into good condition and improving the state of his hide.

The action of diuretics is proverbially uncertain ; hence the necessity of having a large number from which to select, and to enable us to try a variety of them in succession. In many of the cases in which they are had recourse to, their effects, even under the most favourable circumstances, are at best but temporary, the watery accumulations speedily recurring, inasmuch as they depend on incurable organic diseases for their source.

Where the dropsy is of a passive kind, or dependent on great general debility of the system, the simultaneous or subsequent exhibition of tonics and stimulants is, as we have already seen, very useful in aiding or confirming the cure.

In cases of gravel and stone, diuretics and abundant diluents are often had recourse to in order to render the urine less concentrated, and consequently less irritating, as well as liable to form deposits.

Under the head of diuretics we have also arranged, for convenience of reference, such medicines as seem to modify the sensibility of the kidneys, bladder, and urethra, either by their direct action on those parts to which they are occasionally carried by the circulation, or by their stimulant or tonic influence on the digestive organs, which being thus enabled more perfectly to fulfil their functions, assimilation of the food is more complete, and consequently less labour remains for the urinary organs, and their secretion is of a less irritating quality.

Of the influence of temperature, and of the condition of the skin over the urinary secretion, we have evidence in its loaded state and diminished quantity during summer and after being long in heated apartments, as also in its augmented bulk and less proportion of saline ingredients in frosty weather. In diseases of the urinary apparatus the importance of suitable clothing, moderate exercise and friction, the occasional use of the warm bath, a mild climate, and such other means as are known to sustain the subsidary action of the cutaneous vessels, should never be forgotten.

℞ Mist. Amyg. ℔ij.   Potass. Nit ℨj. Solve. Fiat Emulsio.   Take three tablespoonsful every hour.

℞ Potass. Bitart. ℨij.   Aquæ Ferv. ℔ij. Cortic. Limon. et Sacch. q. s. ad conciliand gustum. Use as common drink.

℞ Nit. Potass. gr. x.   Bitart. Potass. gr. xv.   Pulv. Acac. gr. x.   Sacch. ℨss.   M.   A powder to be taken every fourth hour in a cupful of the warm decoction of Barley. (Dropsy.)

℞ Spartii Cacumin. Concis. ℥j.   Aquæ ℔j.   M.   Boil it down to one half and strain.

℞ Colaturæ ℨvij.   Spirit. Æther. Nit. ℨij. Syr. Zingib. ℨvj.   M.   A mixture.   Take two tablespoonsful every other hour.

℞ Junip. Bacc. Contr. ℨij. Sem. Anisi Contus. ℨij.   Aquæ Ferv. ℔j.   M. Macera per horas iij. et cola.   Take a cupful.

℞ Infus.   Cascar. ℨvj.   Spirit. Junip. Comp., Spirit. Æther. Nit. āā ℨj- Confect. Arom. ℨjss.   M.   A mixture. Take two tablespoonsful three times a day.

℞ Potass. Subcarb. ℨj. Infus. Gentian.

Co. ʒvij. Spirit. Junip. Comp., Tinct.
Cardam. Comp. āā ʒiv. A mixture. Take three spoonsful every fourth hour.

℞ Pulv. Jalap. gr. xv. Potass. Bitart. ʒij. Pulv. Zingib. gr. v. Oxymel. Scillæ q. s. A Bolus.

℞ Potass. Bitart. ʒjss. Junip. Bac. et Cacum. Contr ℥ss. Pulv. Jalap. ʒij. Oxymel. Scillæ ʒj. Syr. Zing. ʒss. Tere bene simul. An Electuary. Take one or two spoonsful three times a day.

℞ Sodæ Carb. Exsic. ʒj. Sap. Duri Ƌiv. Olei Junip. ♏vj. Syr. Zing. q. s. Fiat Massa, in Pil. xxx. dividenda. Take three a day. (Renal Calculus, &c.)

℞ Potass. Bitart. ʒj. Pulv. Scillæ gr. ij. Pulv. Cinnam. Comp. gr. iv. Sacch. ʒss. M. A powder. To be taken three times a day.

℞ Scillæ Rad. Exsic. gr. xij. Potass Nit. ʒj. Sacch. ʒj. Pulv. Cinnam. Comp. ʒss. M. Divide in Pulv. vj. Take one twice a day.

℞ Pil. Scillæ Comp. Ƌiv. Hydr. Chloridi gr. v. Divide in Pil. xx. Take two night and morning.

℞ Pil. Hydr. ʒj. Pulv. Scillæ Ƌj. Opii gr. v. Conf Rosæ q. s. ut fiat Massa, in Pil. xx. dividend. Take one three times a day. (Ascites and Anasarca.)

℞ Pulv. Digit., Pulv. Scillæ āā gr. j. Pil. Hydr. gr. iij. M. A pill. To be taken every morning and evening.

℞ Pulv. Digit. gr. x. Pulv. Scillæ gr. xv. Hydr. Chloridi gr. v. Extr. Gentian. q. s. Divide in Pil. x. Take one night and morning.

℞ Infus. Digit. ʒiv. Potass. Acet. Ƌj. Spirit. Æther. Nit. ʒj. Aquæ Cinnam. ʒv. M. A draught. To be repeated every sixth hour. (In Hydrothorax. To be continued till the urine is increased, unless the pulse, head, or digestive organs, be affected

by it, when it should be instantly discontinued.)

℞ Mist. Camph. ʒjss. Am. Carb. gr. viij. Spirit. Æther. Nit. ʒj. Tinct. Digit. ♏xxx. M. A draught. To be taken twice a day.

℞ Tinct. Scillæ ʒij. Spirit. Armor. Comp. ʒij. Spirit. Æther. Nit. ʒiv. Infus. Calumbæ ʒvij. M. A mixture. Take two tablespoonsful three or four times a day.

℞ Acet. Colch. ʒv. Potass. Acet ʒij. Aquæ Fœnic. ʒvij. Spirit. Junip. Comp. ʒss. M. A mixture. Take two tablespoonsful three times a day.

℞ Decoct. Senegæ ʒv. Tinct. Scillæ ʒj. Spir. Junip. Comp. ʒiij. Syr. Simp. ʒiv. Spirit. Æther. Nit. ʒij. M. A mixture. Take two tablespoonsful every four hours. (In Dropsy, with great debility and oppression of chest.)

℞ Infus. Diosmæ Crenatæ (Buchu) ʒvij. Tinct. Diosmæ, Tinct. Cubebæ āā ʒiv. M. A mixture. Take two tablespoonsful three times a day. (In Chronic Diseases of the Prostate, Bladder and Kidneys, Gravel, &c.)

℞ Uvæ Ursi ʒjss. Carb. Sodæ Exsic. ʒss. Pulv. Cinnam. Comp. ʒss. Conf. Rosæ q. s. Divide in Bolus vj. Take one three times a day. (In Chronic Inflammation of the Kidneys and Bladder, Calculous Affections, &c. Three grains of Extract. Conii may occasionally be added with advantage to each dose.)

℞ Uvæ Ursi Fol. ʒij. Aquæ Ferv. ℔ss. Macerate for three hours and strain.

℞ Colaturæ ʒvijss. Acid. Sulph: Dil. ʒj. Tinct. Digit. ♏lx. Syr. Papav. ʒiij. M. A mixture. Take three tablespoonsful three times a day. (In Chronic Larnygitis and Bronchitis.)

℞ Decoct. Uvæ Ursi, Liq. Calcis āā ʒiv. M. Take a wine-glassful (ʒii.) four times a day.

℞ Infus. Pareiræ ʒviij. Extr. Ejusdem ʒij. Tinct. Hyosc. ʒij. M. A mixture. Take three tablespoonsful three times a day. (Chronic inflammation of the Bladder, Calculous Affections, Rheumatism, &c.)

℞ Infus. Pareiræ ʒviij. Acid. Nitr. Dil. ♏xl. M. A mixture. Of which take three tablespoonsful three or four times a day. (In Calculous Deposit consisting of the triple phosphate, announced by the iridescent pellicle on the surface of the urine.)

℞ Chimaphilæ Umbellatæ ·(Pyrolæ) ʒj. Aquæ ℔ij. Decoque ad ℔j. Cola. Colaturæ adde Liquor. Carb. Potassæ ʒij. Take four tablespoonsful three times a day. (In Dropsy and Chronic Affections of the urinary Organs.)

℞ Tinct. Ferri Mur. ♏xij.; Aquæ Tepid. ʒj. M. A draught, to be repeated every fifteen minutes, until nausea, or a flow of the urine is induced. (In retention of urine, Dysury, and Hæmorrhage from the Urinary Organs.)

℞ Tinct. Lyttæ ʒij. Tinct. Camph. Co. ʒij. Tinct. Cinch. Comp. ʒijss. M. A mixture. Give the child ♏xxx. three times a day. (In Hooping-cough. The dose may be cautiously increased.)

XI. EMMENAGOGUES.

THE measures proper to be employed with a view to the establishment or restoration of the menstrual discharge are as numerous and dissimilar as the varieties of amenorrhœa. For their full consideration we must refer to a former portion of this work, where all the forms of this affection are treated of. In most cases it is much more to the management of the general health, the establishment of a sound condition of the assimilative functions and of the nervous system, and bringing the vascular system into a natural state, or one equally remote from plethora and from anæmia, than to any medicine supposed to act specially on the uterine organs, that we should look for the removal of this disorder, or, to speak more correctly, of this symptom of disorder.

The means usually resorted to in the asthenic variety of amenorrhœa, to which we must here chiefly confine our attention, are reducible for the most part to general stimulants and tonics, antispasmodics and purgatives. The latter in particular, when combined with bark, or iron, are very effectual in some of the more common forms, in which a general torpor of the system is complicated with a remarkably defective action of the stomach and bowels. The use of the pediluvium and warm hip bath, the passing of feeble electrical shocks through the pelvis, and the application of a few leeches to the groin or adjacent parts, so as to favour a determination of blood towards the uterus, are often useful auxiliaries.

℞ Pil. Galb. Comp., Pil. Aloes cum Myrrhâ āā Ꝋij. M. Divide in Pil. xx. Take two twice a day. (At the same time either of the following preparations of iron may be taken; and at the approach to the menstrual period, two or three leeches applied to the upper part of the thighs, or the tepid hip bath employed, and sinapisms applied to the breasts.)

℞ Quin. Disulph. gr. xij. Pil. Aloes cum Myrrhâ Ꝋijss. M. Divide in Pil. xij. Take two twice a day.

℞ Pulv. Jacob. Veri ʒss. Guiaci Resin., Pil. Aloes cum Myrrhâ āā Ꝋij. Syr. Simple. q. s. Divide in Pil. xxiv. Take two three times a day.

℞ Mist. Ferri Comp. ʒjss. Aquæ Cinnam. ʒss. M. A draught. To be taken three times a day.

℞ Vini Ferri ʒj. Tinct. Aloes Comp. ʒvi. Tinct. Castor. ʒij. M. A mixture. Of which a teaspoonful may be taken three times a day, in a cupful of the infusion of Chamomile.

℞ Pil. Aloes cum Myrrhâ, Pil. Ferri Comp. āā ʒj. M. Divide in Pil. xxiv. Take two or three twice a day.

℞ Myrrhæ Pulv. Əj. Ferri Sulph. gr. jss. Sodæ Carb. gr. iv. Tinct. Croci ʒj. Aquæ Menthæ Puleg. ʒjss. M. A draught. To be taken three times a day.

℞ Sabinæ Fol. Exsic., Pulv. Zing. āā gr. vj. Potass. Sulph. ʒss. M. A powder. To be taken twice a day. (A stimulant emmenagogue. Its employment demands much caution, and may generally be dispensed with.) For formulæ containing Hydriodate of Potass, see ALTERATIVES.

℞ Liq. Ammon. ℳxij. Lactis Tepidi ʒjss. M. (For a vaginal injection.)

XII. ANTACIDS.

Including Absorbents and Antilithics.

THESE are, as their name imports, medicines for neutralizing acidity. The substances which exercise this power in the most direct manner are the fixed and volatile alkalies, either in their simple or in their carbonated state, together with lime and magnesia. These all act, however, for the most part only as palliatives, neutralizing the acidity already existing in the stomach or bowels, without in any degree preventing its almost immediate regeneration, whether by secretion or fermentation. To obviate permanently the tendency to the excessive formation of acid, we must have recourse to such measures dietetic and medicinal as may gradually improve the tone of the digestive organs. With this view regular exercise, and the enjoyment of a pure bracing air, are very important, together with temperance in regard to vinous stimulants, abstinence from malt liquors, pastry, made dishes, and crude vegetables.

The food, of which a fair proportion should consist of animal substances, should be taken at regular and moderate intervals, as from five to seven hours, inasmuch as both eating too frequently and fasting too long tend in a remarkable degree to weaken the stomach, and cause an extrication of superfluous acid. Over-anxiety of mind, intense and prolonged intellectual exertion, late hours, and all species of dissipations are likewise injurious. Bitters and other tonics, and especially the mineral acids (and above all the sulphuric), in a dilute form, frequently prove very useful in counteracting the morbid tendency in question. We have likewise known great benefit from taking frequently in the course of the day, for a length of time, a teaspoonful of the white of egg beaten up raw.

In the mean time, or till the debilitated state of the stomach has been permanently corrected, the alkalies and earths above alluded to form useful resources. In respect to neutralizing power, ammonia stands at the head of them all; magnesia comes next, then lime, and last on the list stand soda and potash. Magnesia is, however, in the great majority of instances, deserving of a preference, both on account of its comparatively inert nature rendering the precise adaptation of the dose less important, as well as from its insolubility, causing it to remain longer in the stomach, or till the time for its operation arrives, and finally, from its forming with the acid a compound of gently aperient

qualities. This last circumstance renders it very valuable in the most frequent cases of chronic dyspepsia in which constipation coexists; as well as for gouty subjects, in whom an open state of the bowels is very important. When there is much flatulence, or it is desirable that the dose should be comprised in as small bulk as possible, the calcined magnesia, and especially Dr. Henry's pre-paration, is to be preferred. Its solution in carbonated water is a very con-venient form of exhibition, and much the least disagreeable to most persons, as well as less apt to give rise to the formation of the concretions in the intes-tines to which we have already alluded. When acidity gives occasion to troublesome diarrhœa, as is so often the case in early infancy more especially, lime is to be preferred either in the form of chalk (its carbonate), or in that of lime water. When the alkalies are resorted to with a view to correcting acidity, the carbonates, or rather the bicarbonates, ought commonly to be selected, provided flatulence is not complained of, inasmuch as they are less likely to irritate the mucous membrane. The liquor potassæ is, however, in some cases, much more effectual. Its use requires caution; but with this it has been carried safely, and with conspicuous advantage, by gradual increase, so high as the fluid drachm, and upwards, at a dose (repeated thrice in the day) in some obstinate cases of scaly diseases of the skin, connected apparently with derangement of the digestive organs. It seems not only to obviate asce-scency, but also, when properly diluted, to exercise a considerable power of soothing the irritable mucous membrane.

℞ Liq. Potass. ℨij. Liq. Calcis ℨvj. M. A mixture. Take one or two tablespoonsful, if the acidity be trou-blesome, in a cupful of weak broth. (To correct acidity and tendency to the formation of lithic acid deposit in the urine. To be taken in a small cupful of chicken broth, beef tea, flax-seed tea, or infusion of chamomile.)

℞ Liq. Calcis, Lactis Vac. ā̄ā ℨvj. M. To be used as a drink.

℞ Potass. Carb. gr. x. Infusionis Gen-tianæ Comp. ℨjss. Tinct. Cascar. ℨj. M. A draught. To be taken three times a day. (In Acidity of Stomach, and lithic acid diathe-sis. Potass and its carbonates are preferable in the latter case to Soda, as the compound they form with Uric Acid is more soluble.)

℞ Liq. Potass. ℳxx. Mist. Cretæ ℨij. Tinct. Calumb. ℨj. M. A draught. To be taken three times a day.

℞ Liq. Ammon. ℳxv. Mist. Amyg. ℨij. Tinct. Opii ℳvj. M. A draught. To be taken three times a day. (Acidity of the Primæ Viæ.)

℞ Sodæ Carb. Exsic ℨjss. Pulv. Cin-nam. Comp. ℨss. Sapon. ℨss. Bal-sami Peruv. q. s. ut fiant Pil. xxx. Take three three times a day. (In lithic diathesis, and Chronic Irritation of the Urinary Organs.)

℞ Ammon. Carb. gr. viij. Extr. Rhei gr. viij. Syr. Zing. q. s. Divide in Pil. iv. Take one or two pro re natâ if acid be abundant in the sto-mach.

℞ Magnes. ℨj. Aquæ Menth. Pip. ℨxv. Tinct. Aurant. ℨj. M. A draught. To be taken pro re natâ. (Heart-burn.)

℞ Magnes. Carb. gr. x. Sodæ Carb. gr. v. Pulv. Zing. gr. iij. Pulv. Glycyr. gr. xij. M. A powder.

℞ Magnes. ℨij. Pulv. Rhei Əij. Aquæ Cinnam., Aquæ Font. ā̄ā ℨiijss. Spir. Ammon. Arom., Syr. Zing. ā̄ā ℨiv. M. A mixture. Take two tablespoonsful three times a day, having previously shaken the vial. (Cardialgia, Pyrosis, &c.)

℞ Solut. Magnes. (ope Acidi Carbon.) ℨxij. Syr. Aurant. ℨjss. Tinct. Cardam. Co. ℨjss. M. A draught. To be taken pro re natâ. (Acidity of Stomach. Magnesia in solution

is much less disagreeable to the taste, and less prone to form alvine concretions, than in its pulverulent state.)

N.B.—Acidity of Stomach is often much more effectually combated by the mineral acids, and especially sulphuric acid, in a very dilute form, than by its more direct chemical antagonists, the alkalies and absorbent earths. (For Formulæ, see STIMULANTS and TONICS.) Opiates have also, as remarked by Cullen and others, a very remarkable power of restraining the secretion of

acid, and especially when combined with bitter tonics, as in the following formula of Dr. Osborne:

℞ Tinct. Opii ʒj. Tinct. Rhei, Tinct. Humuli āā ʒjss. M. Take ♏xxiv. three times a day, in a dessert-spoonful of water. (It should be taken on an empty stomach.)

For the medicines proper in those cases of Calculus resulting from the predominance of the alkaline diathesis, see the acid mixtures, &c., under the heads of STIMULANTS and DIURETICS.

XIII. LITHONTRIPTICS, OR ANTILITHICS.

MEDICINES exhibited with a view to the removal or palliation of calculous affections scarcely appear to demand a separate place in our classification. It is doubtful, indeed, whether there exist any remedies deserving strictly the title lithontriptics, if we are to understand by it substances capable, with safety, of dissolving stone or gravel within the body. For formulæ by which the symptoms connected with them may be in some degree assuaged, and an attempt made to prevent the continuance of deposit, the reader is referred to antacids and tonics, including the mineral acids, to diuretics, demulcents, and narcotics, or sedatives. For the mode of their application, and especially of that of alkalies and acids, which requires the utmost discrimination in order even to avoid doing harm, the article on calculous disorders in a previous part of this work is particularly worthy of perusal.

The uric acid concretions are the most frequent ; and here it is to the alkalies, to lime, and, above all, to magnesia, that we look for aid. The phosphates of lime and of this earth along with ammonia and magnesia require, on the other hand, the cautious exhibition of an acid. Whatever may have been the original nucleus, the phosphatic diathesis is apt sooner or later to occur. A very great difficulty often arises in practice from the circumstance of the successive layers of the calculus being of different, and even opposit natures. The actual condition of the urine should be almost daily tested, and the treatment modified accordingly.

XIV. REFRIGERANTS.

THESE are medicines which are supposed to be capable of diminishing the temperature of the body without inducing debility. The acids, especially those furnished by the vegetable kingdom, and nitre, have very commonly received credit for such powers. Acidulous drinks certainly tend, in a remarkable degree, to relieve thirst, and so to diminish irritation and feverishness in many acute disorders, but require caution where the mucous membranes of the chest, or of the digestive or urinary organs are inflamed. Cold water and ice are the refrigerants of the most extensive applicability and most certain efficacy. Cold

drinks are highly beneficial in many febrile diseases, and cool fresh air is invaluable. The cold affusion produces the most happy results, in simple fevers unattended with internal inflammation, as well as in small-pox and scarlatina, provided the skin be hot and dry, and the pulse quick and strong, and the disease in its early stage. Where, however, internal inflammation coexists, or the pulse is feeble, and the skin cool, or a sensation of chillness is complained of by the patient, cold affusion is highly improper. In doubtful or intermediate cases, tepid sponging is preferable. In uterine hæmorrhages, the cold dash directed on the hypogastric region is a very powerful remedy; in delirium ferox and raging madness, the dropping of cold water on the top of the head is a most potent sedative, and one requiring great caution in its application, inasmuch as, if pushed too far, it might cause dangerous and even fatal collapse. In inflammation of the brain and its membranes, the application of a bladder filled with pounded ice, or of cloths dipped in cold water, or evaporating lotions, are often productive of much benefit, the body and extremities being kept warm. In a great variety of hæmorrhages, and in inflammations of the skin and of the stomach, and in the case of wounds, the external and internal employment of cold is a precious resource. In hectic, sponging the chest and neck with cold vinegar and water has often seemed to exercise a marked control over the progress of the symptoms in cases of pulmonary disease.

Cold applications generally require to be suspended during the menstrual period, and cold affusion or shower-bath is rarely admissible in advanced pregnancy, except perhaps in those long habituated to its use.

℞ Spir. Vini. Rectif. ʒj. Aquæ Font. ʒv. M. An evaporating lotion. (To reduce the heat of inflamed parts.)

℞ Ammoniæ Hydrochlor. ʒj. Aquæ Font. ʒv. Spir. Rect. ʒj. M. A discutient lotion. (In swelled testicle or other inflammatory tumours.)

℞ Liq. Ammon. Acet., Aquæ Distil., Spir. Rect. āā ʒij. M. A Lotion. (In Phlegmonous Inflammation.)

℞ Ammon. Hydrochlor. ʒij. Acid. Acet. Dil. ʒvj. Spir. Camphoræ, ʒij. M. A Lotion. (In Sprains and Contusions, and to promote the absorption of ecchymosed blood.)

℞ Liquoris Plumbi Diacet. ʒj. Acid. Acet. Dil. ʒij. Spirit. Rectif. ʒj. Aquæ Rosæ ʒvij. M. A Lotion.

℞ Liq. Ammon. Acet. ʒvj. Spir.

Rosmar. ʒij. Aquæ ʒxvj. M. A Lotion. (To be applied to the head in the headache of the earlier stages of Fever, &c.)

℞ Potass. Nit. Ammon. Hydrochlor. āā ʒss. Aquæ Perfrig. ℔j. M. A Lotion. (To be applied as above, immediately after its solution, by means of lint or old linen saturated with it, and frequently replaced. If used as a substitute for ice, the proportion of the salts used should be much greater than this, or about as one of each to three of water. The mixture may be made in a bladder and thus be conveniently applied to the head in Fever, or to the tumour in Strangulated Hernia, &c. It should be renewed at short intervals. A very intense degree of cold may also be produced by the sedulous evaporation of ether.)

XV. DEMULCENTS AND EMOLLIENTS.

DEMULCENTS are substances of a mucilaginous, gelatinous, or oleaginous nature, which tend to defend the parts to which they are applied from irritating

matters; and at the same time to relax and to soothe inflamed membranes, either by direct contact, or by continuous, contiguous, or remote sympathy. It is almost exclusively in diseases of the mucous membranes of the respiratory, digestive and urinary organs that they are employed.

The jellies and decoctions formed of arrow-root and other similar farinaceous substances constitute amongst the best and least irritating species of nutriment in diarrhœa and dysentery, subacute inflammation of the stomach, and convalescence from various debilitating diseases whilst the digestive powers are still weak. Enemata of starch with or without the addition of an opiate are found often of great service in allaying irritation within the rectum, and in the neighbouring portions of the urinary and genital organs. The decoction of sarsaparilla, which is commonly arranged under the head of diaphoretics, might perhaps with equal propriety, so feeble are its obvious medicinal qualities, be placed here. Liquorice, one of the most useful of the class of demulcents, is sometimes employed with good effect to relieve the heartburn connected with acidity.

Emollients are in their action very similar to demulcents. The term has generally been restricted to relaxants adapted for external application. Heat and moisture conjoined constitute the most effectual emollients, of which we have daily evidence in the happy results of the applications of poultices and fomentations in painful and inflammatory affections, contused wounds, &c.; and oily and mucilaginous additions are sometimes thought to augment their efficacy. Some of the milder liniments and ointments also belong to this class.

℞ Mucilag. Acaciæ ℨij. Aquæ ℨiv. Syrup. Tolut., Aquæ Flor. Aurantii āā ℨj. A mixture. Take one tablespoonful every second hour. (In irritation of the mucous membranes, either simply, or as a vehicle for narcotics, or to sheath irritating medicines. It may be rendered more agreeable in some cases by acidulating it slightly with lemon juice or sulphuric acid.)

℞ Olei Amyg. ℨj. Pulv. Acac. ℨij. Tere bene simul et adde gradatim Aquæ Distil. ℨv. Aquæ Cinnam. ℨj. Syr. Papav. ℨiv. A mixture. Take one tablespoonful frequently. (Bronchitis, &c. A couple of drachms of Wine of Ipecacuanha may often be added with advantage.)

℞ Cetacei ℨij. Vitel Ovi j. Syr. Althææ ℨiv. Aquæ Cinnam. ℨss.; Aquæ Rosæ ℨivss. A mixture. Take one tablespoonful from time to time. (Bronchitis, &c.)

℞ Infus. Lini Comp. Oij. Potass. Nitr. ℨj. Mannæ ℨj. M. A mixture. Of which a wine-glassful may be taken occasionally. (In Gonorrhœa. Slightly aperient and diuretic.)

℞ Camphoræ, Potass. Nitr. āā Əj. Pulv. Acaciæ ℨj. Mist. Amyg. ℨvj. A mixture. Take two tablespoonsful every three hours. (In Chordee, Strangury, with plentiful dilution.)

℞ Acaciæ Gummi ℨss. Aquæ ℔ij. Solve. To be used as a common drink. (In Strangury from blisters, and Dysury from inflammation of the urethra, from whatever cause. It is one of the most common ptisans in the hospitals of France in all inflammatory diseases, especially of the mucous membranes of the stomach and intestines. It may be flavoured with syrup, with bitter almonds, and in some instances also with lemon juice, but not if the urinary organs are in an irritable state.)

℞ Oryzæ ℨss. Aquæ ℔iij. Decoque ad ℔ij. To be used as a drink. (In Diarrhœa, Dysentery. It may be flavoured with Syrup of Red Rose, or with Aromatic Sulphuric Acid, or combined with the Infusion of Catechu and other astringents.)

℞ Cornu Cervi Rament. ℨiv. Micæ Panis ℨj. Aquæ ℔iij. Decoque ad

libras ij. Cola. Adde syr. Simpl. ʒij. Aquæ Cinnam. ʒiv. M. Take from time to time two or three table-spoonsful. (In Chronic Diarrhœa and the advanced stages of Inflammatory Affections, where a light nutriment is requisite. This is " the white decoction" of the French hospitals, and of Sydenham nearly.)

℞ Carnis Vitulinæ ʒiv. Aquæ ℔ij. Decoque ad ℔jss. To be used as a drink. (Demulcent and slightly aperient. In the irritation of the mucous membrane of the intestines from mercury, &c. Its laxative quality may be increased, if requisite, by the addition of an ounce of Tamarinds, or a grain of Tartrate of Antimony.)

℞ Althææ Offic. ʒj. Aquæ Bullient. ℔ij. Syr. Simp. q. s. To be drank freely. (In inflammations of the Chest, Abdomen, and especially of the Kidneys and Bladder. " Eau de Guimauve," of the French hospitals.)

℞ Ichthyocollæ ʒij. Aquæ ℔ij. Decoque ad ℔j. Cola, et adde Lactis Vaccini ℔j. Sacchari ʒj. M. Take three or four tablespoonsful occasionally. (Demulcent and Nutritive.)

℞ Decocti Althææ Rad. ℔j. Liq. Plumb. Diacet. ʒj.—ʒij. M. A lotion. (In Lichen, Eczema, and Impetigo.)

℞ Furfuris Tritici ℔iv. Aquæ Frigidi ℔xij. M. Boil, strain, and add it to a warm bath. (To form an emollient bath in acute cutaneous diseases, as Eczema, Impetigo, Lichen, Herpes, &c. The water should not be much above 90°. The patient may continue in it from half an hour to two hours ; one or two pounds of isinglass dissolved in water may be substituted if expense be unimportant.)

℞ Feculæ Tuber. Solani, Decoct. Rad. Althææ āā q. s. Mix the Fecula with the cool Decoction, then add the remainder of the Decoction, and boil it down to the proper consistence for a cataplasm. (An excellent poultice in irritable disease of the skin, applied lukewarm. It does not become sour or rancid.)

XVI. ANTHELMINTICS.

Some of the most important and generally applicable remedies in the treatment of worms (especially the ascarides vermiculares, and lumbricoides) will be found under the head of tonics and purgatives. Of the latter class, the most commonly useful are calomel and jalap in large doses, castor oil, croton oil, rhubarb, aloes, senna, scammony, and gamboge.

Of medicines which seem to exert a special influence over the worms themselves, a few are here subjoined.

℞ Semin. Santonici, et Semin. Tanaceti rude Contus. āā ʒss. Pulv. Valer. ʒij. Pulv. Jalap. ʒjss. Sulph. Potass. ʒij. Oxymel. Scill. q. s. et fiat Elect. Take one teaspoonful every night and morning. (Lumbrici and Ascarides. Its use should be continued for five or six days.) (*Bremser.*)

℞ Artemisiæ Santonicæ ℈j. Hydrarg. Chloridi gr. vj. Pulv. Rhei ʒss. Camphoræ gr. xij. Syr. Simp. q. s. M. Divide in Bolos ij. Take one in the morning, and the other after six hours have elapsed, unless a full evacuation have occurred before that time.

℞ Stanni Pulv. ʒj. ; Extr. Artem. Absinth., Pulv. Jalap. āā ʒij. Syr. Aurant. q. s. M. Divide in Bolos xij. Take one every half hour, until a free evacuation occur. (In Ascarides, Lumbrici, and Tænia.)

℞ Dolichi Pruriens Mucunæ ʒj. Theriacæ ʒj. M. Fiat Elect. Take one teaspoonful every morning. (In Lumbrici and Ascaridas. A purgative should be given every second or third day.)

℞ Absinthii, Tanaceti āā ʒiij. Valer. Radicis Tritæ ʒij. Cort. Aurant. ʒj. Aquæ Fervent. ℥viij. Macera per horam. Cola. An enema, to be injected every night and morning. (In Ascarides. Its efficacy is remarkably increased by the addition of half a drachm of the " Ol. Empyreumat. Cornu Cervi," or of a drachm of Chabert's Oil.)

℞ Tinct. Ferri Muriat. ʒiv. Aquæ ℥viij. M. An enema. (Ascarides; a purgative of Calomel and Jalap being administered simultaneously (*Darwall*), and Chamomile Infusion drank thrice a day for a fortnight afterwards.)

℞ Mist. Assafœt., Lactis Vac. āā ʒiv. M. An enema, to be given at bedtime. (Ascarides. Assafœtida in five-grain doses four times a day for two days, followed by a purgative (Rhubarb) on the third day, has also been found useful; as has likewise a starch injection containing half an ounce of Turpentine. Half-drachm doses of Turpentine administered in half an ounce of Mucilage thrice a day for a week has proved very effectual in expelling the Lumbrici of children.)

℞ Ol. Tereb. ʒj.—ij. Decoct. Hordei Frig. ℥j. M. A draught. (Tænia. The dose may be repeated every morning for three days running, or in persons of delicate frame every second morning. If it do not purge within two hours, a dose of Castor Oil should be administered. A very effectual remedy. It occasionally causes a temporary headache and giddiness, like intoxication.)

℞ Filicis Maris. Rad. Contrit. ʒij. To be taken early in the morning in a cupful of Mint-water, and after two hours, a purgative Bolus is to be administered, viz. :—

℞ Hydr. Chloridi gr. v. Jalap. Ðj. M. A Bolus. (In Tænia. The medicine to be worked off by drinking plentifully of green tea. This was Madame Nouffler's celebrated remedy, save that six grains of Gamboge and twelve of Scammony were given in the Bolus in place of Jalap, and the quantity of Calomel was double that here specified.)

℞ Decoct. Filicis Maris ʒiv. (℥jss. ad ℔ij.) Æther. Sulph. ʒj. M. A draught, to be taken in the morning, and afterwards, without delay, administer an injection of Decoct. Filicis ʒx. Æther. Sulph. ʒii. One hour after, give the following purgative mixture :—

℞ Ol. Ricini ʒij.; Syrup. Flor. Persic. ʒj. M. A mixture. (Bourdier's treatment of Tape Worm. An æthereal solution of the oleo-resinous principle in the male fern root, has been found very effectual by Peschier in destroying these parasites. The dose is 30 drops in bread pills, one-half of which is taken at night, and the remainder the following morning; a dose of Castor Oil being given an hour after the latter. *Chabert's Oil* is one of the most generally successful remedies in this affection. The following is the formula for its preparation and use) :—

℞ Olei Empyreumatici Cornu Cervi ʒij. Olei Terebinth. ʒvj. M. Let the mixture stand three days, then distil ʒvj. from a glass retort. Pour it out into six small vials well stopped, and kept in a cold and dark room. Take ♏xv. (gradually increasing the dose to ʒj.) in a little Cinnamon water, every night and morning, for five or six weeks. (The bowels should be well cleared out with the aperient vermifuge electuary of Bremser, given above, before the use of this oil is commenced, and occasionally during its employment. It seems not only to destroy the Tape Worm, but also to prevent its reproduction in the great majority of cases. Its administration requires caution, though it is much less energetic and dangerous

than the "animal oil of Dippel" (the empyreumatic oil obtained from the Hartshorn rectified, &c.), the latter being three or four times as strong as Chabert's Oil. These oils become dark-coloured and unfit for use by long keeping and exposure to light, and then require to be redistilled.)

℞ Pulv. Rad. Granati Cort. ℥ss. Divide in Pulveres vj. Take one every half hour, until the sixth repetition. (The employment of the bark of the root of the pomegranate has been recently revived with much success in the treatment of Tape Worm. The last dose should be followed by an active aperient, as Senna and Salts; and the whole treatment may be repeated at the interval of a week, to the third time. It occasionally causes a transient stupor or giddiness, or vomiting.) (*Elliotson.*)

℞ Cort. Rad. Punicæ Granati ℥ij. Aquæ ℔ij. Macera per horas viginti-quatuor. Decoque ad ℔j. Adde Syrupi Zingiberis ℥j. M. Divide in partes tres. Take one every half hour, until the third repetition, beginning in the morning. (It may also be simultaneously exhibited in the form of enema. A large dose of Castor Oil, with Syrup of Lemon, is generally administered the night before.)

XVII. ANTIPHLOGISTIC, ANTISYPHILITIC, ALTERATIVE, AND DEOBSTRUENT REMEDIES.

Under these heads we have collected together, rather with a view to practical utility than in accordance with strict accuracy of scientific arrangement, formulæ for such medicines as exert a peculiar control over the capillaries throughout the system at large, as manifested in the power of restraining inflammation in its acute or in its chronic form, or else in that of promoting the absorption of inflammatory or other abnormal deposits (mercury, antimony, iodine).

To have arranged these under the head of stimulants, or of tonics, as some systematic writers have done, or to separate from the rest the most valuable amongst them (mercury), and place it under the head of sialagogues in a distinct class, thus fixing on one of the least important effects of a medicine as the grounds for its classification, could scarcely be considered as an improvement even in respect to theoretic principles of arrangement, and would assuredly be of much less advantage as to the great object of all medical classification,—aiding the memory by judicious associations of a practical tendency.

℞ Hydr. cum Cretâ ℥ss. Pulv. Ipecac. gr. x. Pulv. Rhei Ðij. Pulv. Cin. Comp. gr. x. Pulv. Sacch. Albi ℥j. M. Divide in Pulv. x. Take one two or three times a day. (Mesenteric disease, &c. A deobstruent for infants.)

℞ Hydrarg. Chlor. Ðj. Antimon. Potassio-tart. gr. iv. Guiaci Gum. Res. ℥j. Tere optime, et adde Confect. Rosæ q. s., et fiant Pil. xx. Take one night and morning. (In chronic inflammations of the joints, and of internal organs, and of the skin, eyes, &c. In many cases a pill every night or second night is sufficient.)

℞ Massæ Pil. Hydr. ℥j. Divide in Pil. xij. Take one three times a day. (In Syphilis, Acute and Chronic Inflammation of the Liver, &c.)

℞ Pil. Hydr. Chlor. Comp. ℥ss. Extr. Sarsæ, et Extr. Tarax. āā ℥j. Divide in Pil. xxx. Take two three times a day. (Alterative.)

℞ Hydrarg. Chloridi ℥ss. Opii gr. v. Conf. Rosæ q. s. Divide in Pil. xx. Take one twice a day. (In Syphilis, Chronic Hepatitis, and subacute inflammation of various organs.)

℞ Hydr. Chloridi ℥ss. Opii gr. v. Pulv.

Antimon. Ɗj. Conf. Rosæ q. s. ut fiant Pil. xv. Take one every fourth hour. (In acute inflammation of the viscera, Acute Rheumatism, Synovitis (after bloodletting and aperients.) Invaluable in inflammation of the serous membranes more especially. The Antimonial Powder may be omitted, when it deranges the stomach or bowels. A much smaller quantity of Mercury, given at very short intervals, will often salivate very rapidly, and may be trusted to in cases which are not of extreme urgency, and especially where the after-effects of the remedy are subject of apprehension : thus, a single grain of Calomel will frequently be sufficient for every purpose, as in the following formula of Dr. Law) :—

℞ Hydrarg. Chlor. gr. j. Extract. Gentianæ q. s. M. Divide in Pil. xij. Take one every hour.

℞ Hydrarg. Bichlor. (Oxymur.) gr. ij. Spir. Rect. Ʒiv. Aquæ Distil. Ʒiijss. M. Fiat Mist. Take a teaspoonful daily in a cupful of the decoction of barley, or of sweetened water. (In Syphilitic Affections, Lepra, &c., the dose may be cautiously increased to two, three, or even four teaspoonsful. It should not be taken on an empty stomach.)

℞ Hydr. Bichlor. gr. iv. Ammon. Bichlor gr. v. Solve in Aquæ Fervent. pauxill. Adde Micæ Panis q. s. ut fiant Pil. xx. Take one daily. (Syphilis. It may be guarded, if requisite, with Opium.)

℞ Hydr. Bichlor. gr. j. Tinct. Cinch. Ʒij. Solve. Take a teaspoonful twice a day in a cupful of the infusion of chamomile. (In Scrofula.)

℞ Hydr. Acetatis Ʒss. Camphoræ Rasæ Ʒss. Opii gr. x. Syr. Papav. q. s. ut fiant Pilulæ xxx. Take one every night and morning. (Syphilis. May be gradually increased to four or five pills at a dose.)

℞ Hydr. Chlor. Ʒij. Liq. Calcis ℔bj.

M. A Lotion. (Common Black Wash. Applicable to syphilitic ulcerations and irritable sores.)

℞ Hydr. Bichlor. gr. xxv. Liq. Calcis ℔bj. M. A Lotion. (In syphilitic sores requiring to be stimulated.)

℞ Hydr. Binoxidi (Oxidi Rubri) Ʒss. Adipis Præp. Ʒj. Ceræ Albæ Ɗiv. M. An ointment. (In Chronic Inflammation of the Tarsi and Conjunctiva, a minute portion being smeared along the edges of the palpebræ, so as to produce an abundant secretion from the Meibomian glands.)

℞ Hydr. Binoxidi gr. v. Zinci Sulph. gr. x. Adipis Ʒj. M. An ointment. (In Tarsal Ophthalmia, in scrofulous habits.)

℞ Antim. Potassio-tart. gr. vj. Aquæ Cinnam., Aquæ Distil. āā Ʒviij. Syr. Althææ Ʒij. M. A mixture, of which take a sixth part every two hours. (Pneumonia, Acute Rheumatism, &c. After the sixth dose, the medicine is intermitted, except in very severe cases, for seven or eight hours. Where it continues to produce much sickness and purging, three or four drachms of the Compound Tinct. of Camphor may be added to the mixture, or an ounce of the Syrup of Poppies substituted for that of Marsh Mallows. In some instances, it controls the inflammation, without affecting either the stomach or bowels.) (*Laennec.*)

℞ Antimonii Oxysulphureti (Sulph. Antim. Aurat.) gr. x. Flor. Sulphuris Ʒjss. Guiaci Resin., Extr. Conii āā Ʒj. Sacchari Fæcis q. s. Divide in Pil. lx. Take three, three times a day. (In Chronic Cutaneous Affections.)

℞ Tinct. Iodinii Comp. ♏x. Aquæ Distil. Ʒj. M. A draught, to be taken three times a day in a cupful of sweetened water, or of the decoction of Sarsaparilla. (In Scrofula, Goitre, Amenorrhœa, Hypertrophy of various organs, Secondary Syphilis, &c. The dose may be cau-

tiously increased to 20 or 30 drops thrice a day, and the Unguent. Iodinii Composit. at the same time applied to the tumours externally, in the case of Bronchocele, Glandular Diseases, &c. Where it causes emaciation, its use must be suspended for a time; so likewise where rapidity of the pulse and palpitations are induced, or cough, loss of sleep, and tendency to cerebral congestion, giddiness and headache, extreme irritability and trembling, or pain in the stomach. Its tendency to produce wasting of the mammæ and testes, when pushed too far, should not be forgotten.)

℞ Potass. Iodidi (Hydriod. Potassæ) gr. iij. Aquæ Distil. ʒj. M. A draught, to be taken three times a day. (Syphilitic affections of the bones, and Chronic Rheumatism, &c. in a glass of Decoction of Sarsaparilla, or of sugar and water. The dose may be gradually increased to five or six grains and upwards; but the very large doses in which it is sometimes administered (even drachm doses) seem to be neither safe nor necessary when long continued. Its frequent impurity may account for such large quantities having done less mischief than might have been anticipated. In Peritostitis, where it is an object to cut the disease short, scruple doses, guarded if necessary with Tinct. Opii, may be administered thrice a day for a short period.)

℞ Potassii Iodidi ʒj. Tinct. Digit. ♏xl. Lactucarii ℈j. Aquæ Distil. ʒiij. Aquæ Flor. Aur. ʒij. Syr. Althææ ʒvj. M. A mixture. A tablespoonful of which may be taken night and morning. (Hypertrophy of the Heart.)

℞ Potassii Iodidi gr. ij. Iodinii gr. j. Aquæ Distil. ʒviij. M. A mixture. Take one third three times a day. (In Scrofula. For children under seven years, the third of the above dose will generally be sufficient, and each draught of it may be sweetened with sugar, just before taking it, but not sooner, as decomposition would ensue. It may be made still more dilute, and used for common drink, where it is to be long continued.)

℞ Ferri Iodidi (Hydriodat.) gr. ij. Aquæ Distil. ʒj. M. A draught, to be taken three times a day in a cupful of sweetened water. (In Scrofula, Chlorosis, Amenorrhœa, Leucorrhœa, Phthisis, Secondary Syphilis, Lepra, &c. the dose may be increased to four grains and upwards. Iodine administered in this form is said to be less liable to accumulate in the system, as it passes off readily by the kidneys; but the facility of the decomposition of Iodide of Iron renders the rapid evolution of an injurious quantity of Iodine possible.)

℞ Ferri Iodidi gr. xxx. Croci Stig. Pulv. ʒj. Sacch. Albi ʒiij. Muc. Trag. q. s. M. Contunde simul, et divide in Pil. xc. Take two or three three times a day. (Stimulant and tonic properties of Iron and Iodine combined as in the preceding formula; but the solution is a much more permanent and therefore preferable form.)

℞ Hydr. Iodidi gr. j. Extr. Glycyr. gr. xij. Pulv. Ejusdem q. s. ut fiant Pil. viij. Take one night and morning. (In Syphilitic Affections, especially when occurring in scrofulous constitutions. Its use requires great caution. The dose may be gradually increased to seven or eight of the above pills in the day.)

℞ Hydr. Biniodidi gr. j. Extract. Glycyr. gr. xxxij. M. Optime. Divide in Pil. xvj. Take one night and morning. (In Syphilis. The dose may be cautiously increased to five or six of these pills at a time. Its employment, like that of Corrosive Sublimate, demands extreme circumspection.)

℞ Hydr. Biniodidi gr. xx. Alcohol. ʒjss. M. A mixture, of which ♏vj; (carefully increasing the dose

to ♏xx.) may be taken twice a day in a cupful of distilled water. (In obstinate Syphilitic Affections. The ointments of the Iodide and Biniodide of the new pharmacopœia are very energetic stimulants applicable to the above cases and to scrofulous and flabby sores. They should be applied only in very small quantity, and to a very limited surface at a time.

℞ Plumbi Iodidi gr. iv. Conf. Rosæ gr. xx. Misce optime. Divide in Pil. xij. Take one night and morning. (In scrofulous affections of the glands, joints, &c. The dose may be gradually increased to three or four pills at a time and upwards. The ointment of Iodide of Lead should be simultaneously applied to the tumours externally. It is a very active and valuable preparation, and less apt to inflame the skin than the ointment of the Hydriodate of Potass.)

℞ Potas. Bromidi gr. xij. Aquæ Distil. ʒiij. Syr. Althææ ʒj. M. A mixture. Take a tablespoonful three times a day. (Deobstruent and stimulant in glandular affections, enlargement of the spleen and heart, Amenorrhœa, &c.)

℞ Potassii Iodidi gr. vj. Iodinii gr. iij. Aquæ Distil. ℔j. Solve. A collyrium, to be applied four times a day. (Scrofulous Ulceration of the Cornea, Inflammation of Conjunctiva, &c. When there is great irritability, a minute quantity of Morphia may be added. The ointments containing Iodine are likewise often rendered much more effectual, by the addition of an opiate. The above solution is also used as a fomentation to scrofulous ulcers, and an injection into fistulous sores.)

℞ Iodinii ʒij. Potassii Iodidi ʒss. Aquæ Distil. ʒviij. Solve. An embrocation. (To excite very indolent strumous diseases. It may be used also through the medium of a cataplasm, being mixed in a flaxseed poultice, and applied very warm. It acts as a powerful rubefacient, or even as a caustic, if the skin be very susceptible. Lugol applies it to scrofulous diseases of the skin and cellular membrane, tubercles, ill-conditioned esthiomenous ulcers, Ozæna, excessive growths, caries, &c. In Lupus it is one of the very best applications that can be made.

To form a bath the whole of the above solution may be added to about forty gallons of water, in a wooden vessel. These baths should produce a slight rubefacient effect on the skin; and their strength may be somewhat increased or diminished, according to their influence. The patient should remain in the bath about half an hour, every second day; and the temperature should be from 96° to 98°. The Iodine is the active ingredient in these baths, the Hydriodate serving chiefly for keeping it in solution. One-third of the above quantity is sufficient for a bath for a child, the strength remaining the same. The solution serves also, when *largely diluted*, for fomenting scrofulous parts, in which we do not wish to produce a very rapid or great increase of action.

N. B. For formulæ for the exhibition of the Nitric and Nitro-Muriatic Acids and Sarsaparilla in Syphilis, as well as that of Turpentine in Iritis and Rheumatic Inflammation, and that of Tincture of Cantharides and of Arsenic in certain obstinate Chronic Cutaneous Affections, over which they exert a remarkable alterative influence, see previous classes, STIMULANTS, TONICS, and DIAPHORETICS, &c.

XVIII. ALKALOIDS.

Formulæ for certain of the Alkaloids and other active medicinal agents not in the British Pharmacopœias.

Brucina—obtained from the false Angustura Bark; action similar to Strychnine, but about six times weaker. Dose gr. ¼ to gr. j.

℞ Brucinæ gr. xviij. Alcohol (36°) ℨj. M. A Tincture:—Take ♏vi. cautiously increasing it to ♏xxx. (Paralysis.)

℞ Brucinæ Pulv. gr. xii. ; Conf. Rosæ ℨss. M. Divide in Pil. xxiv. Take one every night and morning; if necessary, the dose may be gradually increased to two or three pills.

Emetina—obtained from Ipecacuanha, used as an emetic and expectorant; in large doses causes, in consequence of its narcotic properties, stupor and death; has little, if any, advantage over the ordinary preparations of Ipecacuanha. There are two forms of it, the coloured, and the pure or white; the latter being many times (at least four times) as strong as the former. The dose of pure Emetine for an emetic is from gr. ¼ to gr. ij.

℞ Emetinæ Puræ gr. j. Solve in Acido Acetico ♏x.; adde Aquæ Flor. Aurant. ℨiij. Syr. ℨj. M. A mixture: one tablespoonful of which may be taken every fifteen minutes, until vomiting ensues.

℞ Emetinæ Puræ gr. viij. Sacch. Albi ℨiv. Muc. Trag. q. s. Fiat Massa in Trochiscos cc. dividenda. (Each contains 1-25th of a grain of Emetine, a convenient form for children; one every quarter of an hour to the fourth time, or till vomiting supervenes.)

℞ Emetinæ *Coloratæ* gr. iv. Aquæ Flor. Aurant. ℨj. Syr. ℨss. M. A mixture, of which a tablespoonful may be taken every half hour until vomiting occurs.

℞ Emetinæ *Coloratæ* gr. xvj. Syrup. Simp. ℔j. M. Take one or two tablespoonsful at a dose. (A substitute for Syrup of Ipecacuanha.)

Gentianina—obtained from the root of Gentiana lutea; intense bitter. Dose gr. ij.—iv.

℞ Gentianinæ gr. v. Alcohol. ℨj. Solve. A tincture, of which, from a half drachm to a drachm may be taken three times a day, in half a cupful of water. (A tonic bitter.)

℞ Gentianinæ gr. xvj. Syr. Simpl. ℔j. Misce. A Syrup, of which take one to three teaspoonsful at a dose.

Lupulina—obtained from Humulus lupulus; a bitter tonic; slightly narcotic. Dose gr. ij.—vj. or, in the form of tincture (ℨj. Lupuline to ℨiij. Alcohol), ♏x.—xxx.

Salicina.—Antiperiodic; much inferior in efficacy to Quina generally, though it has been known in some instances to succeed after the failure of the latter. Dose gr. ij.—viij.

℞ Salicinæ gr. xij. Extr. Gentian., Pulv. Glycyr. āā q. s. ut fiant Pil. vj. Take two every two hours. (In Ague and Neuralgia; and in Dyspepsia, in smaller doses.)

Indigo.

℞ Indigoferæ Disperm. ℨj. Syr.

Simp. ℥ij.   M.   An Electuary:— Take half a teaspoonful every night and morning.   (In Idiopathic Epilepsy.   The dose may be gradually increased to three or four drachms of Indigo in a day, and its use continued for several weeks.   In overdoses, it produces irritation of the stomach and bowels, and spasmodic twitchings, like strychnia; the former of which may be guarded against by combination with Dover's Powder.   Though it is only in very large doses that it has proved useful, as a matter of precaution we should commence with small ones.   It tinges both the stools and urine of a bluish colour, and appears to aggravate the disease at the first.)

Iodidum Strychniæ gr. ⅛ bis quotidie (ad gr. ¼ caute auct.)   In similar cases with Strychnia (see before) its use requiring great caution.   So also the *Sulphate of Strychnia* which has been employed in France in doses of $\frac{1}{20}$th to $\frac{1}{12}$th of a grain; the energy of its action even exceeding that of Strychnia, partly in consequence of its greater solubility.

Iodidum Sulphuris.

℞ Iodidi Sulphuris gr. xij.   Adipis ℥ss.   M. An ointment. (In tubercular affections of the skin (Lupus and Acne), and in Lepra and Tinea.)

Iodidum Barii.

℞ Iodidi Barii gr. iv.   Adipis Præp. ℥j.   M.   An ointment.   (Scrofulous tumours.   Its employment requires caution.)

Iodidum Zinci.

℞ Iodidi Zinci ℨj.   Adipis ℨj.   M. An ointment.   Rub in one drachm daily.

Iodidum Arsenici.

℞ Iodidi Arsenici gr. iij.   Adipis ℥j. M.   An ointment.   (In Cancerous Diseases, Lupus, &c.   Its use re-

quires extreme caution, and should not be had recourse to till after the failure of all other means.   It should be applied only in very minute quantity, and never to a large surface at a time.)

℞ Chloridi Zinci ℨj.   Farinæ ℥iv.   M. (This powder, moistened with a few drops of water, forms a caustic paste of great efficacy in Lupus.   It is sometimes used of double this strength.   When it is intended to act deeply, the cuticle should first be removed by a small blister.   It is much less dangerous than the arsenical paste of Fra. Come.)

Cyanidum Potassi—has been used in France, America, &c., as a substitute for Prussic Acid, in doses of gr. ¼ to gr. j. in an ounce of a simple syrup, or in a potion twice or thrice a day.

Cyanidum Zinci—gr. ¼ to gr. j. administered in an ounce of simple syrup, as a vermifuge. (*Magendie.*)   Also as a substitute for Prussic Acid, in Hooping-cough, Spasm of the Stomach, &c.

℞ Cyanidi Zinci gr. j.   Magnes. gr. v.   Pulv. Cinnam. Comp. gr. iij. M.   A powder, to be taken every three hours, if the spasm be violent.

Cyanidum Hydrargyri.

℞ Hydrarg. Cyanidi gr. xvj.   Adipis ℨj.   Ol. Ess. Limon. ♏xv.   M. An ointment.   (In some obstinate forms of Impetigo, accompanied with distressing itching.)

Bromidum Ferri.

℞ Ferri Bromidi, Gum. Arab. Pulv. āā gr. xij.   Conf. Rosæ Gall. gr. xviij.   M.   Divide in Pil xxiv. Take two night and morning. (Stimulant and tonic.   Bromine is an irritating poison : its action resembles that of Iodine.   Both it and its compounds have been used in Scrofula and Amenor-

rhœa, Hypertrophy of the Heart, &c.)

Aurum.—Gold in a state of extreme subdivision, its oxide and its salts, have all, like similar preparations of Mercury, a very powerful influence on the system.

Chloridum Auri.—The Chloride of Gold is an energetic poison. In very small doses it has been found to act as a general stimulant and alterative, like Corrosive Sublimate, but with less tendency to affect the salivary glands. It has been employed in Germany and France in Secondary Syphilis, Scrofula, and Herpetic Affections, in doses from $\frac{1}{20}$th to $\frac{1}{16}$th of a grain. Its effects must be carefully watched. It should only be had recourse to in very obstinate cases.

℞ Auri Chloridi gr. v. Pulv. Glycyr. ʒij. Syr. Simp. q. s. Misce optime. Divide in Pil. c. Take one or two three times a day.

℞ Auri Chloridi gr. j. Amyli Pulv. Əv. Misce optime. Divide in Pulveres xv. (One of these powders to be rubbed into the gums night and morning.)

Chloridum Auri et Sodii.—This has been more frequently employed in France than the preceding; the dose being from $\frac{1}{20}$th to $\frac{1}{10}$th of a grain, internally. Also in the form of an ointment (gr. x. to ʒss. Adipis,) of which about the size of a pea is applied to a small blistered surface, so as to be readily absorbed.

————

Pilulæ Arseniatis Ferri.   (Biett.)

℞ Proto-Arseniatis Ferri gr. iij. Extr. Humuli ʒij. Pulv. Althææ (vel Glycyr.) ʒss. Syr. Aurant. q. s. M. Mix it carefully. Divide the mass into eighty-eight pills, of which one may be taken daily. [See the previous cautions as to the mode of exhibition of Arsenic, under the head of Tonics.]

N.B. For formulæ for *external use*, as gargles, collyria, lotions, liniments, ointments, baths, &c., see particularly the classes of STIMULANTS, NARCOTICS, ASTRINGENTS, and EMOLLIENTS, &c. For enemata, see PURGATIVES, NARCOTICS, ASTRINGENTS, &c.

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The matter embraced in the Three Volumes now presented, was published in London in five separate volumes, and at intervals republished in this country. The rapid sale of these volumes, embracing as they do a History of Practical Medicine, is the best evidence of the favour with which it has been received by the physicians of the United States. Embodying as it does the most recent information on nearly every disease, and written by men who have specially devoted themselves to the study of the disorders which form the subject of their articles, the work is the most valuable for reference within the reach of a practitioner. The arrangement of the Library into classes of diseases, grouped according to the cavities of the body, is much more agreeable to the reader than the alphabetical order, and nearly as convenient for reference.

The reader will not fail to perceive some inequality in the articles, even of the same authors; the subjects with which an author is most familiar, and upon which he had previously written, are usually the best treated and most elaborate. Among the most finished treatises are those of Dr. Christison on the urinary organs, and of Williams and Joy on the thoracic viscera; several other essays are excellent monographs, and very few fall much below the average standard of the series.
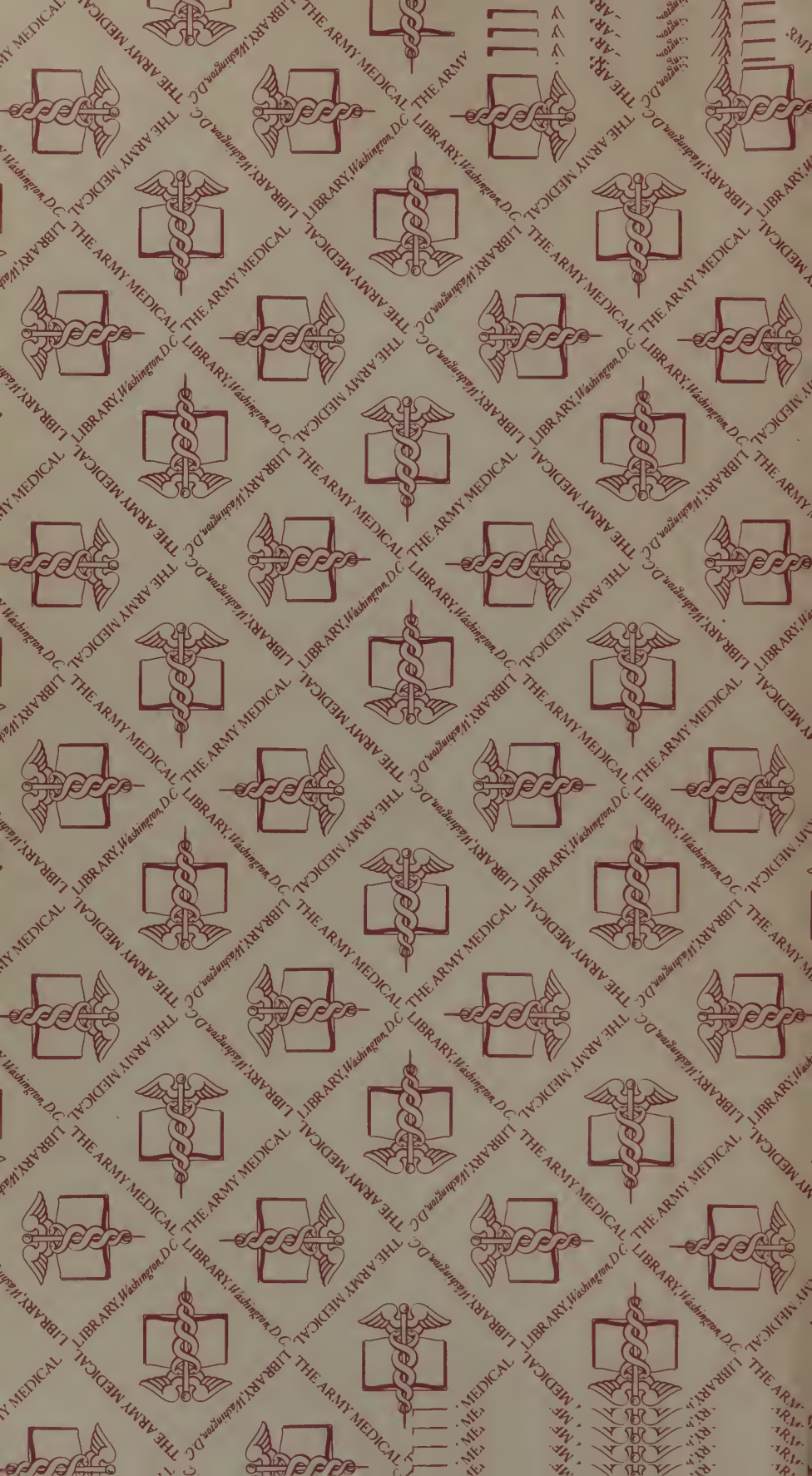
The object of the publishers in compressing the five volumes of the former edition into three is to place the work at such a price as to be within the reach of every reader. There is no abridgement or alteration whatever of the text of the former edition, and the general appearance of the volumes is scarcely inferior. The notes added to the last four volumes have been revised, and some additions made to them. New notes have also been added to the first volume, which was not revised in the former edition. For the note on Remittent Fever, the American Editor is indebted to Dr. Stewardson, for those on Ophthalmia to Dr. W. P. Johnston. The principal notes are one on Typhoid Fever, another on Remittent, one on Tuberculous Meningitis, and a fourth on Delirium Tremens. It was neither intended nor wished to overload the work with annotations; the notes refer either to some trivial errors which have crept into the text, or to subjects which were treated less completely than they deserved to be; they are, therefore, comparatively few in number. Several diseases are, from the difference of climate, more frequent and severe in the United States than in Great Britain, and the articles which relate to them required some additional matter.
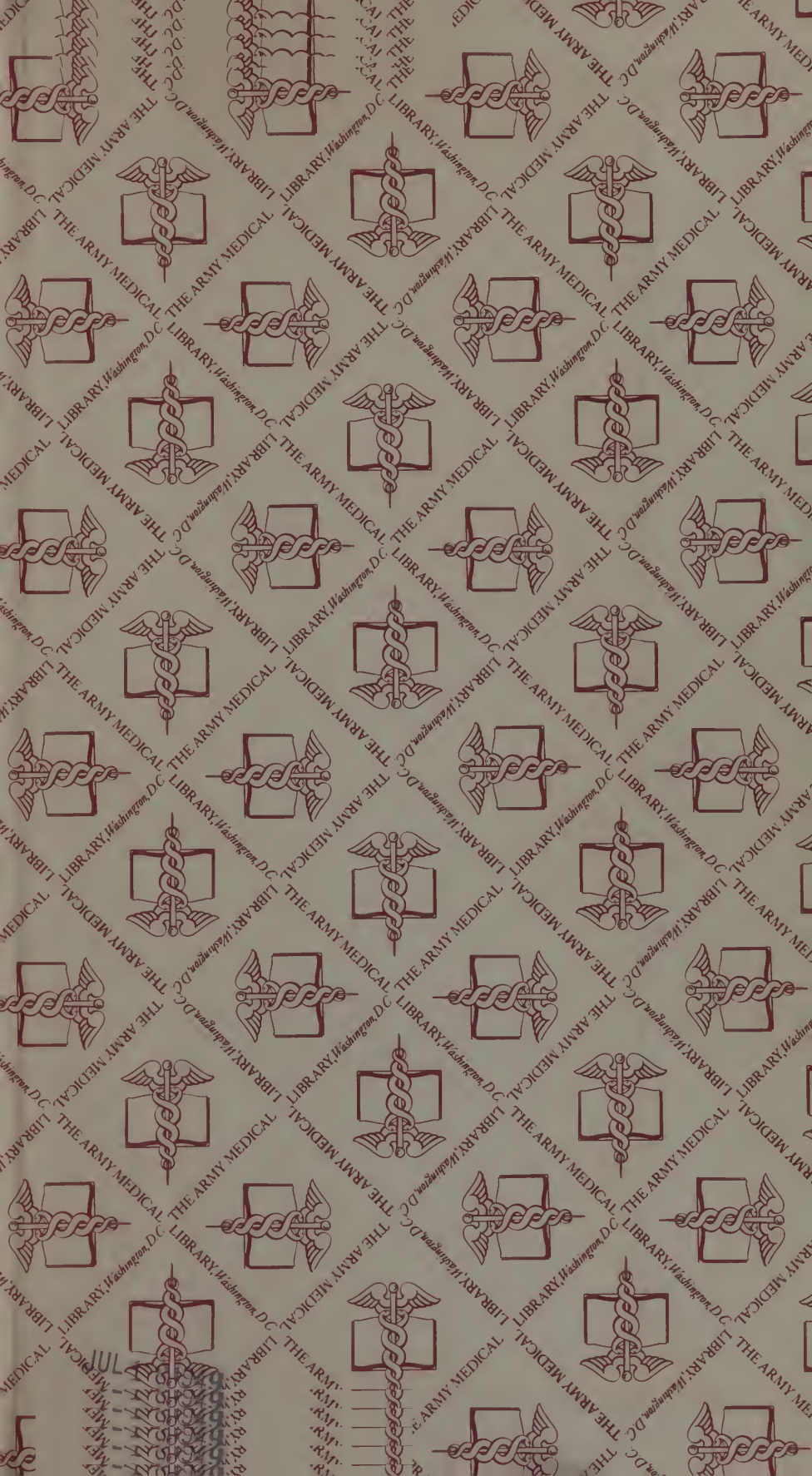
The notes which appeared in the London edition are designated by the word Author. Those of the American Editor are indicated by the letter G.

The Editor of this edition did not feel himself at liberty to make any change in the formulæ of the prescriptions, which are published towards the end of the last volume, believing, as he does, that very strong reasons alone can justify such use of a scientific work. One alteration, which adapts them to the custom of this country, was, however, made;—that is, the translation of the directions for the doses and administration of the prescriptions from Latin into English: there is an obvious convenience in this change.

The Three Volumes now presented contain the first series, that on *Practical Medicine*, of a Library of Medicine, edited by Dr. Tweedie, and now in course of publication, and are complete in themselves. The series will be continued in London, embracing works on Midwifery,* Surgery, Anatomy, and the other Departments of Medical Science. Such of them as may be deemed worthy of republication will be issued here with notes and additions, each work under its particular title, but in a style and manner to match this work.

* The work on Midwifery, by Edward Rigby, with numerous wood cuts, has lately been issued by the publishers of these volumes.